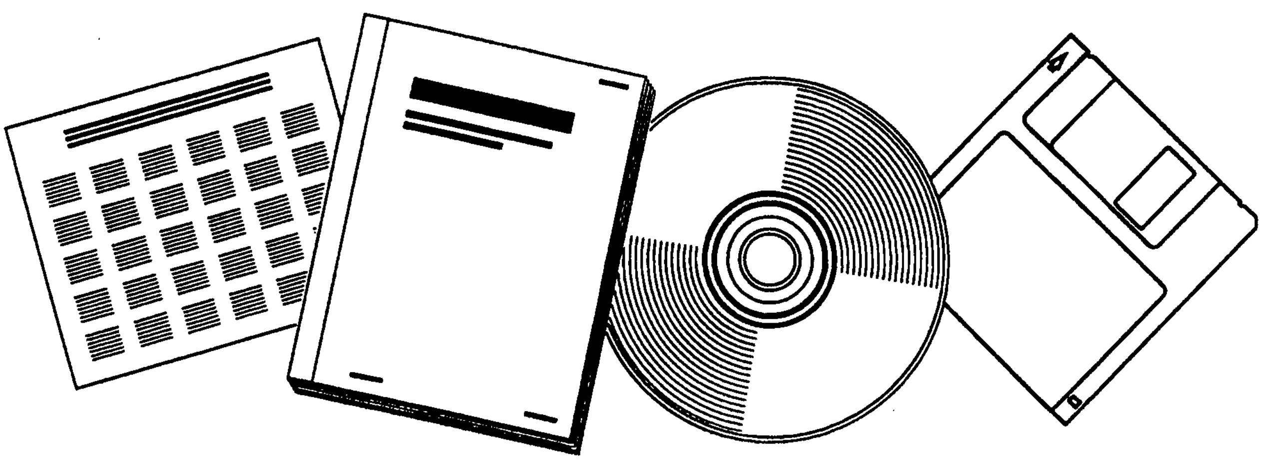
PB98-110240

TRUCK NOISE LEVEL UPDATE FOR NEW JERSEY

AUG 97

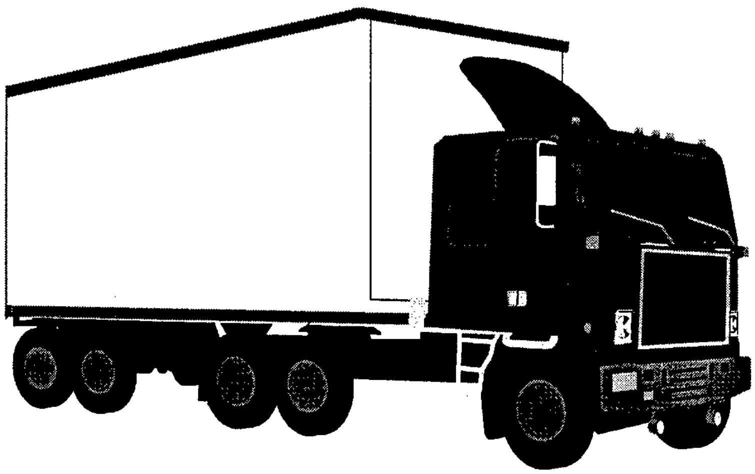


U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

NJDOT Report No. 97-003-7950

PB98-110240

TRUCK NOISE LEVEL UPDATE FOR NEW JERSEY



Final Report

By
Robert Sasor
Principal Engineer

August 1997

Prepared By
New Jersey Department of Transportation
Division of Capital Program Management
Bureau of Quality Management Services
Research Unit

In Cooperation with
U.S. Department of Transportation
Federal Highway Administration

NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the New Jersey Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/NJ-97/003		

4. Title and Subtitle	5. Report Date
Truck Noise Level Update for New Jersey	August 1997
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
S. Robert Sasor	97-003-7950
9. Performing Organization Name and Address	10. Work Unit No.
New Jersey Department of Transportation CN 600 Trenton, NJ 08625	11. Contract or Grant No. NJ SPR Study 7950
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered Final Report September 1992 -December 1996
Federal Highway Administration U.S. Department of Transportation Washington, D.C.	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report presents the findings of a research study to update the noise emission levels of trucks traveling on flat, upgrade, and downgrade highways in New Jersey. Measurements were taken over the period September 1992 through August 1994. Current levels are presented and they are compared to those taken in New Jersey in May through December of 1977. Measurements were made for 2 to 6 axle trucks and 2 & 3 axle buses. Reference Energy Mean Emission Levels (REMEL's) as a function of speed were determined for two general truck classes: (1) medium trucks & buses and (2) heavy trucks. N.J. truck levels for 1992-94 are compared to 1977 levels using regression analysis and non-parametric statistics. REMEL's for 1992-94 N.J. trucks are also compared to the 1994-95 truck REMEL's in the new FHWA Traffic Noise Model (TNM).

It was found that 1992-94 N.J. truck noise levels were lower than 1977 levels by 2.3-3.5 dBA. There were some slight differences between the 1992-94 N.J. and the new TNM truck noise levels -- most notably for upgrade roadways; but in practical terms, noise levels predicted using either set of REMEL's were not significantly different. It is recommended that either the 1992-94 N.J. REMEL's or the TNM REMEL's be used for all future noise predictions, since they are about 2.5 dBA lower than the REMEL's presently used in the STAMINA 2.0 traffic noise prediction program. The result of using the lower REMEL's should be a decrease in the number of noise impacts identified, and accordingly, fewer or smaller noise barriers will need to be constructed to mitigate these impacts. Thus, a savings in both time & money will be realized in the design and construction of noise barriers.

This report also presents measurement methodology, site selection, and data collection, reduction, & analysis procedures for the update study.

17. Key Words	18. Distribution Statement
Highway Traffic Noise, Truck Noise Vehicle Reference Level Measurements Noise Emission Levels, REMEL's Traffic Noise Prediction	No Restrictions

19. Security Classif (of this report)	20. Security Classif. (of this page)	21. No of Pages	22. Price
Unclassified	Unclassified	130	

Form DOT F 1700.7 (8-69)

DEDICATION

This report is dedicated to Joseph Flesch who died in February of 1986. Joe was with NJDOT for 12 years as a Research Assistant and Engineering Aide. Joe's dedication and hard work on site selection, data collection, data reduction, and data analysis for the 1976-1980 N.J. truck noise study, contributed greatly to its successful completion. I will always remember with fondness the remarkable eagerness with which he attacked assignments.

ACKNOWLEDGEMENTS

I would like to gratefully acknowledge all members of the Research Unit and the former Bureau of Research who contributed their expertise and time to help complete this study.

Helping take truck noise measurements at the field sites throughout New Jersey were Vincent Nichnadowicz, Mike Strizki, and Ali Anzabi. Vincent Nichnadowicz also helped with site selection, data reduction, and setup of the equipment van.

Zoltan Zeisky's assistance in setting up data collection and data reduction equipment, and trouble shooting problems was invaluable.

Special thanks to Nick Vitillo who wrote a BASIC program which helped speed data reduction; he also provided the graphic for the cover.

Thanks to project managers Tom Fuca and Mark Marsella for their guidance and support.

Statistical sections of this report were reviewed by Dick Weed, and other sections were reviewed by Raj Chawla, Frank Palise, Nick Vitillo, and Brian Strizki.

I thank Domenick Billera of the Bureau of Environmental Analysis for his support and sponsorship at NJDOT.

And finally, I acknowledge the Federal Highway Administration for their funding and support.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

Figure | Page

LIST OF FIGURES (continued)

LIST OF TABLES

LIST OF TABLES (continued)

Table | Page

SUMMARY AND CONCLUSIONS

This study was undertaken to update the truck noise levels which were measured in New Jersey in May through December of 1977.[1] Truck noise measurements were taken in September through December of 1992, June through December of 1993, and July through August of 1994. This report presents a comparison of the truck noise levels measured in 1992-94 to those measured in 1977, and also a comparison of the 1992-94 N.J. levels to the FHWA levels in the new traffic noise model (TNM) which were measured in 1994-95.[2]

Over the years, NJDOT has used the Federal Highway Administration (FHWA) approved highway traffic noise prediction computer program, STAMINA Version 2.0 to predict expected traffic noise impacts from proposed highways. STAMINA's truck noise emission levels were measured in the mid 1970's. A limited number of heavy truck noise levels were measured in N.J. in the mid 1980's, and they were significantly lower than STAMINA's levels, as well as the N.J. levels measured in 1977. Additionally, more stringent noise regulations went into effect in 1986 (in-use medium and heavy trucks) and January 1988 (newly manufactured trucks). Because there were indications and expectations that present day truck noise levels were markedly lower than those measured in the 1970's, this truck noise update study was begun to accurately determine current truck noise levels.

If, as expected, current truck noise levels are significantly lower than the 1970's reference levels

[1] Sasor, S.R., Determination of Truck Noise Levels for New Jersey, Report No. 81-006-7791, N.J. Department of Transportation, Final Report, July 1980.

[2] Fleming, Greg G., et al., Development of National Reference Energy Mean Emission Levels for the FHWA Traffic Noise Model (FHWA TNM), Version 1.0, Final Report, November 1995, USDOT, Volpe Center.

in the FHWA traffic noise computer program, then it is likely the Department is overpredicting noise levels adjacent to proposed highways. Accordingly, using accurate, current truck noise levels will result in lower predictions of community noise levels, and fewer and less severe anticipated impacts on residents near the highway. This will result in NJDOT designing and constructing fewer and/or smaller noise barriers; the subsequent savings in time and money is the benefit that we expect from this truck noise update study.

Noise levels of individual medium and heavy trucks -- and two & three axle buses as well -- were measured on level, upgrade, and downgrade roadway sections of both controlled access and non-controlled access highways. To facilitate comparisons between current truck noise levels and those from 1977, the same truck classes and roadway categories were used. Also, where possible, measurements were made at the same sites as in 1977. The update study was done on a smaller scale than the 1977 study; however, enough measurements were taken to assure statistical significance.

The truck noise update study was conducted in the following manner: 1) a methodology which insured accurate truck noise measurements was developed, 2) measurement sites were selected with physical characteristics that allowed for accurate measurements, 3) A-weighted* noise level (including 1/3 octave frequencies), speed, descriptive, and meteorological data were collected at the sites, and 4) this data was reduced and analyzed. Reference Energy Mean Noise Emission Levels (REMEL's) as a function of the logarithm of speed were determined for the 1992-94 medium and heavy trucks. These REMEL's and the actual truck noise level data were used for

* A-weighting simulates the reponse of the human ear to sound levels.

the comparison of current and past NJ truck noise levels. REMEL's alone were used for the comparison of current NJ truck noise levels and the reference truck noise levels in the new FHWA Traffic Noise Model.

For this study, truck noise measurements were taken at 25 sites in New Jersey. The goal of site selection was to pick sites from which a representative sample of the N.J. truck population could be collected. Using a 1/3 octave real-time analyzer, the maximum A-weighted noise level and the simultaneous 1/3 octave frequency spectrum (20Hz to 20KHz) were measured for the passby of an individual truck, at a distance of 50 ft from the lane of travel with a microphone located at a height of 4 ft above the ground. The truck's noise was also recorded on a tape recorder and was played back in the lab into a graphic level recorder to check that each truck was isolated from other highway traffic to the extent that its noise level was free from significant interference.

Data reduction was done on nearly 1,200 truck noise level measurements. After checking calibration signals, wind speeds, interfering and extraneous noises, missing data, etc., 222 of these measurements were discarded, and what remained were 974 valid truck noise measurements representing the 13 axle classifications and 6 roadway types for which data was collected. Noise, speed, and descriptive data for the valid measurements were merged into a single computer file for each site. These files were then analyzed using the SAS System of statistical analysis software. Elementary statistics were first calculated on a site by site basis; then calculated again for the twelve truck class-roadway type groups (see Pages 16 & 17 for truck classes and Page 15 for roadway types). Data analysis also included the development of REMEL's for each group under the assumption of normally distributed data. REMEL's were used for both the comparison of 1977 and 1992-94 NJ truck noise levels, and the comparison of current NJ truck noise levels and those in the new FHWA traffic noise model (TNM). * In addition, a special non-parametric analysis method was used to compare present and past NJ truck noise levels.

Conclusions

Medium and Heavy Trucks - 1992-94

For controlled access highways, where median speeds were nearly the same, median noise levels for Heavy Trucks (Truck Class 2) were 2-4 dBA higher than for Medium Trucks & Buses (Truck Class 1); and energy mean noise levels, 3-4 dBA higher (see Table 2, page 38). For non-controlled access highways, median noise levels for Heavy Trucks were about 3-3.5 dBA higher than for Medium Trucks & Buses; and energy mean noise levels, about 3-5.5 dBA higher. Median speeds varied considerably for non-controlled access highways. When tested for normality at the 90% confidence level, truck noise levels for the twelve Truck Class-Roadway Type groups were from normal populations only 50% of the time.

Comparison of 1977 and 1992-94 N.J. Truck Noise Levels

Statistical testing of actual data values using the special non-parametric analysis method indicated that truck noise levels for 1992-94 were from different populations than truck noise levels for 1977 for both the Medium Truck & Bus and Heavy Truck classes. Taken across all roadway types, Medium Truck & Bus noise levels for 1992-94 were 1.5-3.2 dBA lower than for 1977, on average of 2.3 dBA lower (see Page 54). Again, across all roadway types, Heavy

* NJ truck noise levels were measured with a microphone height of 4 feet above the ground; FHWA truck noise levels, with a microphone height of 5 feet above the road surface.

Truck noise levels for 1992-94 were 2.1-4.8 dBA lower than for 1977, on average 3.5 dBA lower (see Page 55).

The findings of the REMEL comparisons, though less accurate because of the assumption of normally distributed data, corroborated those of the non-parametric method. Comparing the 1977 and 1992-94 REMEL vs. speed regressions, showed that 1992-94 truck REMEL's were lower than 1977 REMEL's for essentially all speeds for both the Medium Truck & Bus and Heavy Truck classes (see Pages 41-53). At 50 miles per hour (mph), across all roadway types, 1992-94 REMEL's for Medium Trucks & Buses were 2.1-4.0 dBA lower than 1977 REMEL's, on average 3.0 dBA lower (see Page 40). At 50 mph, across all roadway types, 1992-94 REMEL's for Heavy Trucks were 1.9-5.0 dBA lower than 1977 REMEL's, on average 3.5 dBA lower (see Page 47). Over the 20 year period 1975-1995, FHWA found similar drops in REMEL's for medium and heavy trucks (Reference 2, page 71).

Comparison of 1992-94 New Jersey and 1994-95 FHWA TNM REMEL's for Trucks

The REMEL's for this study were compared to the FHWA Traffic Noise Model (TNM) REMEL's presented in Reference 2. Since bus REMEL's are defined separately for TNM, buses were removed from NJ Truck Class 1 (Medium Trucks & Buses) and REMEL regression lines were recalculated. Comparisons were done for level and upgrade roadways for medium and heavy trucks. For level roadways, TNM REMEL's for baseline conditions (average pavement, constant flow conditions) were compared to NJ REMEL's for both controlled access and non-controlled access highways. For heavy trucks on upgrade roadways, TNM REMEL's were compared to NJ REMEL's for both controlled and non-controlled access highways. Reference 2 states that medium truck REMEL's for upgrades are the same as those for level roadways. Thus, NJ medium truck REMEL's for both controlled and non-controlled access, upgrade roadways are compared to TNM REMEL's for medium trucks on level roadways. Keep in mind that NJ REMEL's are measured with the microphone 4 feet above the ground, and TNM REMEL's are measured with the microphone 5 feet above the road surface. The findings are as follows.

For **level roadways**, TNM REMEL's for medium and heavy trucks have a greater speed dependence that NJ REMEL's (see Pages 58 & 60). The difference between NJ and TNM REMEL's over the central speed range encompassing 80% of the NJ data is ±2.0 dBA and ±2.3 dBA for medium and heavy trucks, respectively. For speeds likely to be used for noise predictions, there is essentially **no difference** (< 3/4 dBA) between the NJ and TNM REMEL's for trucks (see Page 65).

For **upgrade roadways**, TNM truck REMEL's have a greater speed dependence than NJ truck REMEL's, but the difference is not as marked for heavy trucks (see Figures 19 & 20, Pages 62 & 64). The difference between NJ REMEL's and TNM REMEL's is 0 to +3.3* dBA for medium trucks and +0.2 to -2.4 dBA for heavy trucks over the central speed range encompassing 80% of the NJ data. For speeds likely to be used for noise predictions, there are **some meaningful differences** between the NJ and TNM truck REMEL's for upgrade roadways -- -1.7 dBA for heavy trucks on controlled access upgrades and +2.4 dBA for medium trucks on non-controlled access upgrades (see Table 12, Page 66).

* Plus sign indicates that NJ REMEL's are higher; minus sign, that FHWA TNM REMEL's are higher.

However, noise levels **predicted** for upgrades roadways by the two sets of REMEL's do not exhibit these same meaningful differences. This occurs because the differences between NJ and TNM truck REMEL's tend to be in the opposite direction for medium and heavy trucks (see Table 12), because of the dominance of heavy truck noise, and the large number of cars in a typical traffic stream. On Page 67, some examples are given of noise levels predicted for a controlled access upgrade and a non-controlled access upgrade using both the NJ and TNM truck REMEL's.* Even though truck volumes were high in these examples, the following was found:

- For a controlled access upgrade with truck speeds of 50 mph and car speeds of 55 mph, the NJ truck REMEL's predicted noise levels **1.2 dBA lower** than the TNM truck REMEL's.
- For a non-controlled access upgrade with truck speeds of 45 mph and car speeds of 55 mph, the NJ truck REMEL's predicted noise levels **0.1 dBA higher** than the TNM truck REMEL's.

In practical terms, noise levels predicted for upgrade roadways using either the NJ or TNM truck REMEL's **will not be significantly different.**

The benefits of NJDOT using the 1992-94 N.J. REMEL's or the 1994-95 FHWA TNM REMEL's for noise prediction and barrier design are given here. First, the accuracy of any future noise predictions and the efficiency of noise barrier designs will be improved. Secondly, use of the new, lower truck noise levels will, in most cases, result in lower predicted community noise levels. Therefore, NJDOT will design and construct fewer and/or smaller noise barriers to mitigate expected noise impacts for a savings in both time and money. This savings was estimated at $1.5-2.3 million a year for an average yearly noise barrier construction program of $15 million (see Page 69).

---

* No barrier case.

RECOMMENDATIONS

It is recommended that the truck noise levels (REMEL's) determined for this update study (1992-94) or those determined for the new FHWA Traffic Noise Model (1994-95) be used for noise predictions and barrier designs at NJDOT. In practical terms, noise predictions and barrier designs using either set of levels will be virtually the same. Use of these lower, up-to-date truck noise levels will result in a significant savings in time and money to design and construct noise barriers.

Additional findings of this study should be presented in a short supplemental report or paper. This report/paper would include a discussion of the sensitivity of REMEL's to microphone height relative to ground level, and a new method for determining REMEL's which is based on the sound energy of a vehicle's noise level. This new method eliminates the need for an adjustment to the level-mean to arrive at REMEL's (see Reference 2, pages 34 & 35)[2] , and the requirement that noise level data be normally distributed. REMEL's determined by this new method would be compared to REMEL's determined by the method used in Reference 2.

It is further recommended that the Research Unit, in conjunction with the Bureau of Environmental Analysis, conduct a short study to determine the accuracy of the new FHWA Traffic Noise Model (with lower, up-to-date REMEL's) for some existing noise barrier sites by comparing predicted to measured noise levels. The improvement in accuracy over the previous

[2] Ibid., Fleming, Page 1.

FHWA traffic noise computer program would also be documented.[3]

At some regular interval, or if there are indications (either in the literature or otherwise) that vehicle noise emission levels have changed significantly, vehicle REMEL's should be re-measured to insure their continued accuracy.

[3] Menge, C.W., (Bowlby, W., et al. editors), Noise Barrier Cost Reduction Procedure STAMINA 2.0/OPTIMA: User's Manual, Report No. FHWA-DP-58-1, Enhanced Version, Federal Highway Administration, Demonstration Projects Program, April 1982.

INTRODUCTION

This study was undertaken to update the truck noise levels which were measured in New Jersey in May through December of 1977 for Research Study 7910, Determination of Truck Noise Levels for New Jersey. For this update study, truck noise measurements were taken in September through December of 1992, June through December of 1993, and July through August of 1994. This report presents a comparison of the truck noise levels measured in 1977 and those measured in 1992-94. New Jersey truck noise levels for 1992-94 are also compared to the FHWA truck noise levels measured in 1994-95.

Federal noise standards require the New Jersey Department of Transportation (NJDOT) to estimate highway traffic noise impacts on the public for all proposed federal-aid highway construction and reconstruction projects.[4] Expected traffic noise impacts are estimated using the Federal Highway Administration (FHWA) approved highway traffic noise prediction computer program, STAMINA Version 2.0 .* STAMINA's truck noise emission levels were measured in the mid 1970's. Though limited in number, heavy truck noise levels measured in N.J. in the mid 1980's were significantly lower than STAMINA's levels, as well as the N.J. levels measured in 1977. In addition, the more stringent noise regulations that went into effect in 1986 (in-use medium and heavy trucks) and January 1988 (newly manufactured trucks) were expected to lower truck noise levels even more. Because there were indications and expectations that present

[4] "Procedures for Abatement of Highway Traffic Noise and Construction Noise", Federal Aid Highway Program Manual, Volume 7, Chapter 7, Section 3, Federal Highway Administration, U.S.D.O.T., May 1976.

* The FHWA has recently developed a new traffic noise prediction computer program called TNM (Traffic Noise Model).

day truck noise levels were markedly lower than those measured in the 1970's, this truck noise update study was begun to accurately determine current truck noise levels.

It was likely that current truck noise levels were lower than the reference levels for trucks in the traffic noise computer program being used by NJDOT to predict highway noise impacts and design noise barriers. Thus the Department is probably overpredicting traffic noise levels for proposed highways, consequently overestimating the number and severity of noise impacts, and in turn, oversizing noise barriers designed to mitigate these impacts. This update study seeks to accurately determine current truck noise levels, and if they are significantly lower than 1970's levels, then predictions of community noise levels adjacent to proposed highways will be lower. With fewer and less severe noise impacts on residents near the highway, NJDOT will design and construct fewer and/or smaller noise barriers, and there will be a savings in both time and money. This is the benefit that we expect the truck noise update study to provide.

Approach

Noise levels of individual medium and heavy trucks were measured on level, upgrade, and downgrade roadway sections of both controlled access and non-controlled access highways. Measurements were made for the same thirteen vehicle classes (which included two & three axle buses) and six roadway types specified in New Jersey's original truck noise study[1] so that direct comparisons could be made between current noise levels and those measured in 1977. In fact, wherever possible, measurements were made at the same sites used for the original study. Fewer measurements were taken for this update study than for the original study, but enough were taken to assure statistical significance. The truck noise update study was conducted in the following manner: a methodology which insured accurate measurement was developed; measurement sites with physical characteristics such that accurate measurements could be taken were selected; noise level (including 1/3 octave frequencies), speed, descriptive, and meteorological data were collected at the sites; and this data was reduced and analyzed. As part of the analysis, past and present truck noise levels were statistically compared, and Reference Energy Mean Noise Emission Levels (REMEL's) as a function of the logarithm of speed were determined for medium and heavy trucks.

DATA COLLECTION

Measurement Methodology

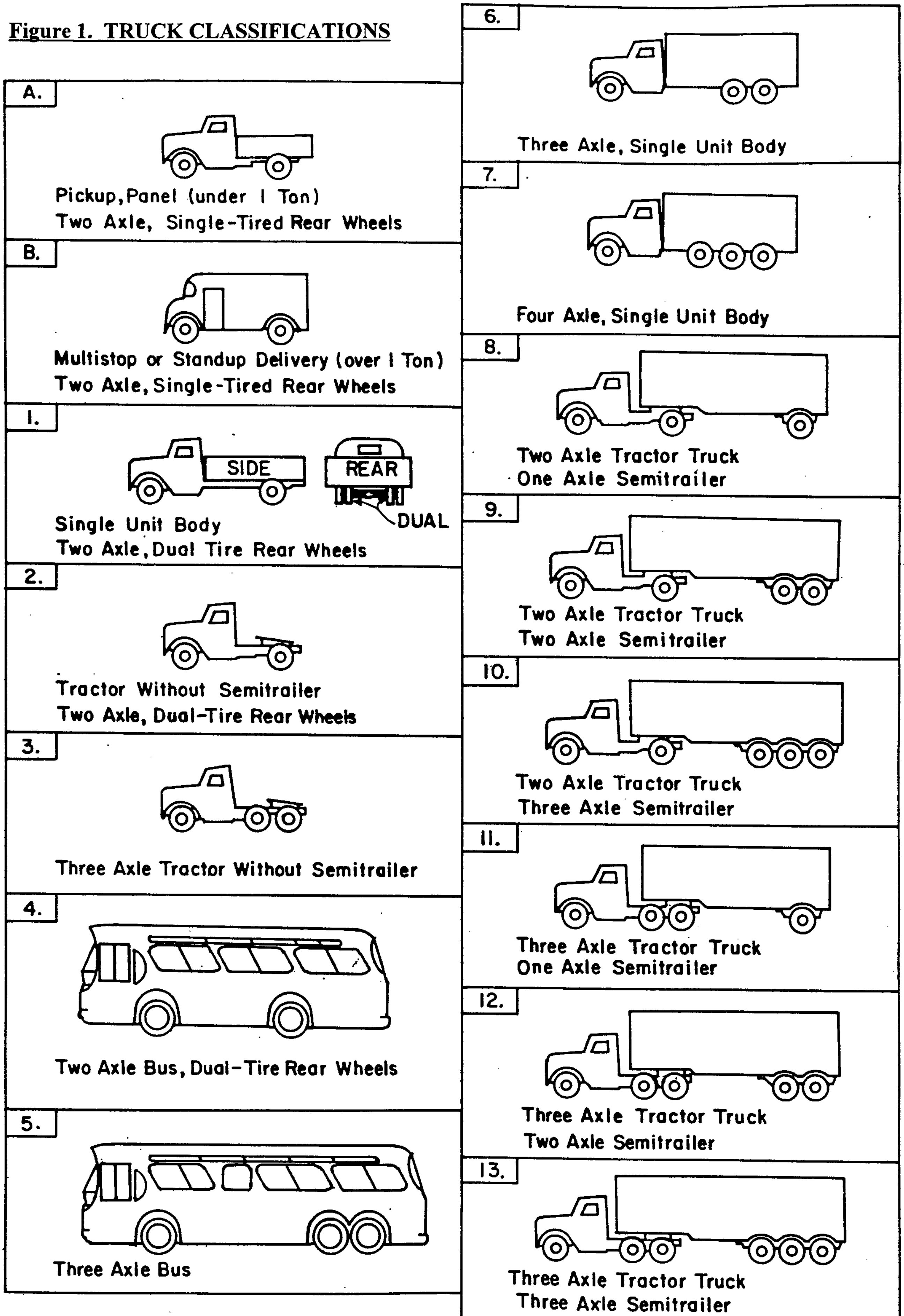
A measurement methodology was developed which insured the accurate measurement of the maximum A-weighted* noise level and simultaneous 1/3 octave frequency spectrum produced by the passby of an individual truck. Measurements were made at a distance of 50 feet from the center of the lane of travel but only for vehicles traveling in the near lane. A system for classifying trucks based on axle configuration was developed; accordingly, each truck fell into one of 13 classes. A roadway classification scheme was determined with roadways divided into six types. A valid measurement criteria was established which guaranteed that the noise of an individual truck was measured without any significant effects from the noise of other highway vehicles. A procedure for conducting field measurements was developed, and the noise measurement equipment which was used for data collection was selected. Some equipment was purchased for the study. The number of measurements that would be taken was determined based on statistical considerations for estimating the mean of a truck class to the desired accuracy. Finally, 25 measurement sites were selected that met the physical site criteria for accurate measurements.

Truck Classification

Noise measurements were taken for trucks having two axles with dual rear wheels, three, four, five, & six axle trucks, two & three axle truck tractors, and two & three axle buses. These types of "trucks" are illustrated in Figure 1, Page 14, which shows Truck Classifications 1 to 13.

* A-weighting simulates the response of the human ear to sound levels.

Figure 1. TRUCK CLASSIFICATIONS



NOTE: Body Types as shown are for sketch purposes only, and it is not intended to imply that they are the only body types encountered in these classifications.

These truck classifications are in keeping with the 1976 federal noise standards which define a truck as any motor vehicle (including buses) having a gross vehicle weight of greater than 10,000 lbs.[4] On the other hand, vehicles in Classifications A & B of Figure 1 were not considered trucks because in general their gross vehicle weights are less than 10,000 lbs. To compare the results of the update study to those for the original study (1977 data), we decided to use the same general "truck" classes determined for the original study. These are medium trucks & buses and heavy trucks. The medium truck & bus class includes "trucks" in Classifications 1,2, 4, & 5; the heavy truck class includes trucks in Classifications 3,6,7,8,9,10,11,12, & 13. See Figures 2 & 3, Pages 16 and 17.

Roadway Classification

Roadways were divided into the six types which are listed below.

(1) Controlled access level (less than or equal to 2% grade)

(2) Controlled access upgrade (greater than 2% upgrade)

(3) Controlled access downgrade (greater than 2% downgrade)

(4) Non-controlled access level (less than or equal to 2% grade)

(5) Non-controlled access upgrade (greater than 2% upgrade)

(6) Non-controlled access downgrade (greater than 2% downgrade)

These types of roadways were selected to investigate their influence on the magnitude and character of truck noise. Highways were divided into controlled and non-controlled access because (a) in general, different average speeds and operating conditions exist on these types of highways, and (b) the 1976 federal noise standards[4] make this distinction in defining highway projects. Truck noise on upgrade and downgrade roadway sections, where decelerations &

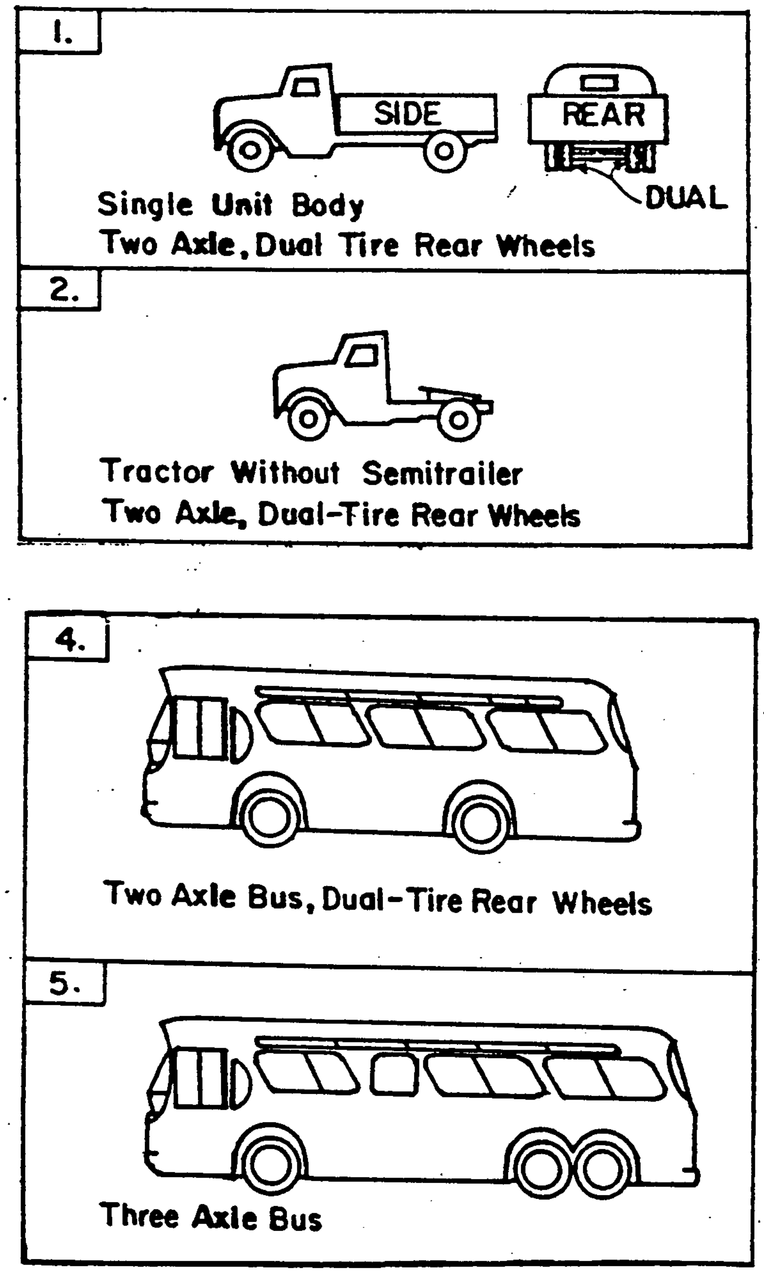


Figure 2. TRUCK CLASS 1
MEDIUM TRUCKS & BUSES

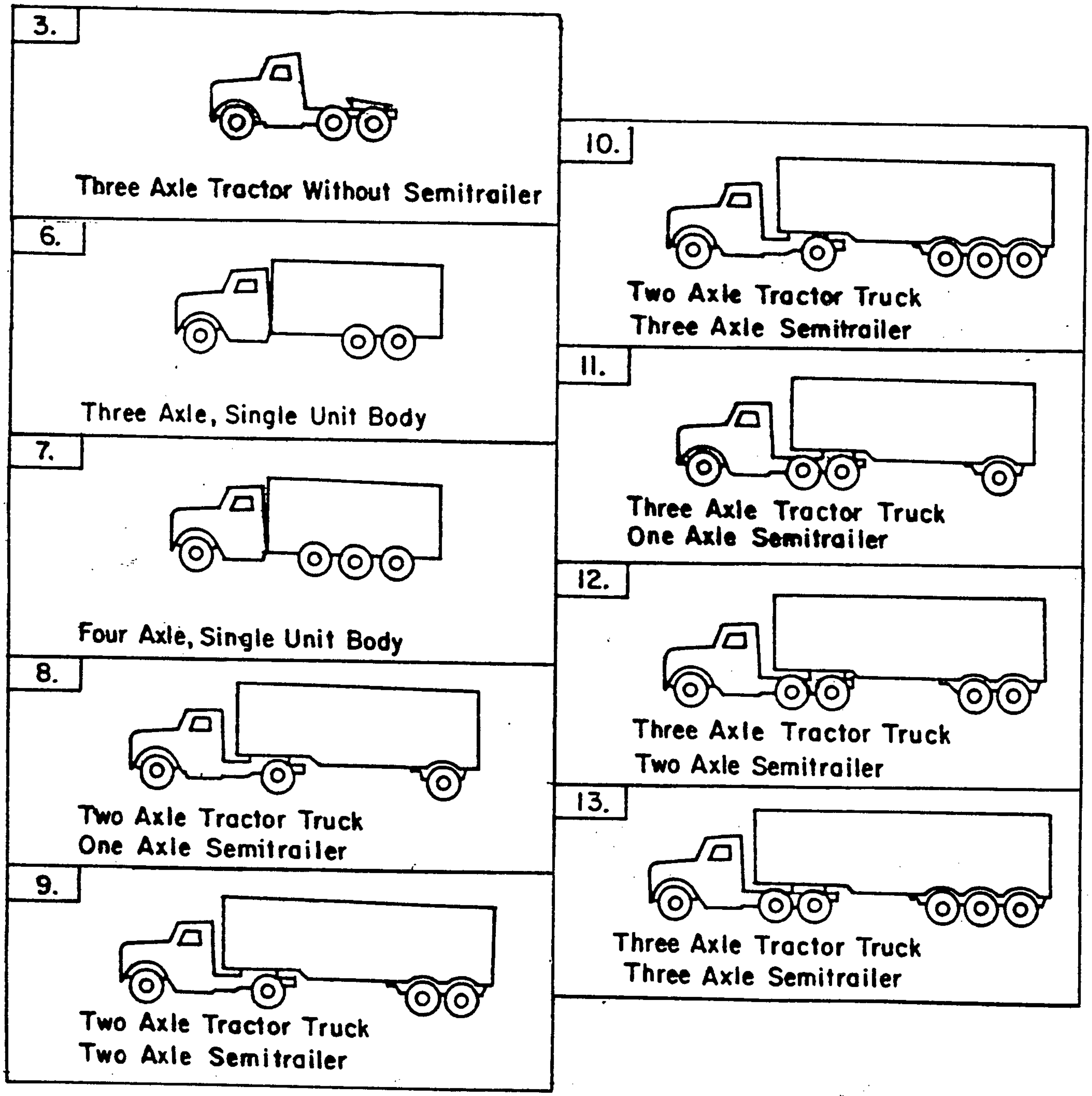


Figure 3. TRUCK CLASS 2
HEAVY TRUCKS

accelerations and different operating conditions occur, was examined to expand the data base beyond cruise conditions.

A Valid Measurement

To obtain an accurate measurement of the noise produced by an individual truck, it must be isolated from other highway traffic. Otherwise the noise due to other vehicles would add to the level of the target truck and result in an erroneously high measurement. In light of this, vehicle spacing requirements were established for field use. The noise from the passby of a single target truck was measured if the target truck was at least 100 feet from passenger cars and 250 feet from other trucks. The use of these vehicle spacing requirements insured a certain degree of isolation, but a final, more accurate check for isolation was done in the laboratory after a time history of the truck passby was plotted. The criterion that the passby time history had to meet was as follows:

> **A truck passby noise measurement was considered valid if the total sound level, as observed on a graphic level recorder trace, rose and fell at least 6 dBA about the maximum level.**

This criterion is explained in detail in Reference 1, Pages 151-157. Setting this valid measurement criteria insured that the measurement of a truck's noise level at 50 feet (the maximum level from the passby) was accurate to within approximately 0.5 dB. If the time history of a truck passby did not meet this valid measurement criterion, then the truck's noise level measurement was considered inaccurate and dropped from further analysis.

Data Collection Procedures

At each of the 25 noise measurement sites, noise, speed, descriptive, and meteorological data were collected by a two man crew. Truck noise level and speed were measured by a Larson-Davis Model 3200 1/3 octave real time analyzer. When set on the "Max Spectrum" setting this analyzer captured the maximum noise level from a truck passby with its corresponding 1/3 octave frequency spectrum from 25Hz to 20,000Hz. The analyzer was manually started when the front of the target truck passed a traffic cone placed 250 feet upstream of the microphone; and manually stopped, when the front of the truck passed a traffic cone 250 feet downstream of the microphone. The analyzer provided an average speed in miles per hour for the truck over the 500 foot interval, by calculating it from the time passage between start and stop (the time of the sample). Every truck which passed the site was sampled if it was sufficiently isolated from other traffic as per the minimum vehicle spacing requirements mentioned earlier.

A description of each truck was taken which included axle configuration, body type, exhaust location, and load condition (if discernible). The wind speed and direction were noted for each truck passby measurement. Temperature & relative humidity were measured at the beginning and the end of the daily sampling period, and barometric pressure was noted at the time of system calibration. The measurement system -- microphone, preamp, cables, etc. -- was calibrated with a 124 dB pistonphone at the start and end of the measurement period and midway for longer periods.

Larson-Davis microphones (Model 2559, 1/2 inch condenser), preamps, and 200 ft. cables were used for the measurements. A single microphone with windscreen was placed on a tripod at a height of 4 feet above the ground, at a distance of 50 feet from the center of the lane in which the truck traveled (only the near lane was used). The signal from the microphone was fed simultaneously to the 1/3 octave real time analyzer and a IV-SJ Nagra two channel tape recorder. The tape recorder was used so that later in the lab (1) a time history of each truck passby could be produced by a graphic level recorder and the valid measurement check performed, and (2) each truck passby could be monitored with headphones for extraneous sounds. Truck noise without weighting (Linear) was recorded on Channel 1 and a description of each truck was recorded on Channel 2. Hand written notations concerning extraneous noises (airplanes, mowers, horns, etc.) and the spacing of other nearby vehicles on the highway were made in the field as required. An instrumented van was used for data collection, and it was parked over 100 feet from the measuring microphone to minimize reflections. Measurements were only taken when the pavement was dry. For a listing of the equipment which was used for data collection see Appendix A, page 73.

Site description data was collected for all sites. It consisted primarily of highway route, direction, and milepost (milepost measured to the foot with a DMI, distance measuring instrument), pavement type (bituminous or portland cement concrete) and number of lanes, shoulder and median details, notes on the terrain at the site, the elevation of the ground at the microphone relative to that of the lane of travel, and grade steepness and length.

Sample Size

The truck noise levels obtained for this study are considered to be representative of the New Jersey truck population in general. Average noise levels of the truck population are estimated from a random sample of limited size. Statistical methods specify the random sample size required so that the mean from a sample can be used to estimate the true population mean with a particular degree of confidence and precision.

The variability of the 1977 truck noise level data was one of the parameters used for calculating the number of truck noise measurements that would serve as a data collection goal for the current update study. To estimate the population mean of maximum passby levels to a precision of ± 1 decibel (confidence interval = mean ± 1 dB) with a 95% degree of confidence, a sample size of 39 was needed. In other words, there is a 95% chance that the true mean level of the population falls within the confidence interval calculated from the sample. The sample size calculation was based on a population standard deviation estimate of 3.2 dB (1977 data), and the assumption that maximum passby truck noise levels are normally distributed.

Accordingly, a goal of data collection was to take 39 or more truck noise level samples for each of the truck class-roadway type groups (for example, heavy trucks on controlled access level roadways). This sample size was exceeded for all of the heavy truck groups and for all but two of the medium truck groups (controlled access upgrade [32] & controlled access downgrade [29]). Under the assumption of a population standard deviation of 3.2 dB, for these sample sizes the 95% confidence interval would be less precise -- ±1.1 dB for medium trucks on controlled access upgrades and ±1.15 dB for medium trucks on controlled access downgrades. For the 1992-94 data, however, the sample standard deviations were less than 2.9 dB, so it is possible that the assumption of a population standard deviation of 3.2 dB was slightly high.

Site Selection

Every attempt was made to utilize the same measurement sites as in the 1977 truck noise study. However for various reasons -- the main reason being construction of buildings in the open areas where the sites were -- 20 of the original 30 sites were used. Five new sites were selected; they replaced 1977 Sites 2,16,19,21, & 25 while keeping the same site number. Thus, measurements were taken at the 25 sites; 14 along controlled access highways, and 11 along non-controlled access highways.

The objective of the selection process was to choose sites from which noise measurements of a representative sample of the truck population in N.J. could be collected. Since NJDOT truck weighing stations were selected with the same objective in mind, we decided, in most cases, to locate truck noise measurement sites along roadways on which these truck weighing stations were located.

All of the sites were required to meet the physical site criteria in Reference 1, pages 175-179 to ensure that accurate truck noise level measurements would be taken. These criteria placed limits on the types and size of sound reflecting objects at a site, and specified general physical characteristics that a site must have, such as, cross section elevations, traffic flow conditions, and ambient noise. Essentially, therefore, measurement sites were level open areas free of large reflecting surfaces with a clear line of sight to the roadway from the microphone position, and ambient noise levels more than 10 dB below the maximum passby level of the target truck. In addition, all of the sites were "soft" (covered with grass or similar absorptive material) in accordance with the definition in Reference 5.[5]

For sites meeting the physical criteria, the following guidelines were used to make the final site selections.

(a) Sites were selected along roads handling traffic flows to and from the northern, southern, eastern, and western portions of the state in an effort to obtain a geographically representative sample.

(b) Site locations were not selected if it was estimated that less than one accurate measurement of an individual truck passby could be made in five minutes. Thus, very low and very high traffic volume sites did not qualify.

(c) For Roadway Types 2,3,5, & 6 (upgrades and downgrades), an effort was made to select grades of varied steepness and length.

More sites were selected in the northern part of the state because the southern part has relatively flat terrain, and the upgrades and downgrades needed for Roadway Types 2,3,5, & 6 were not available there. Figure 4 on Page 24 shows the location of the truck noise update measurement sites. A listing of the sites is given in Tables A-1 to A-6 on Pages 74 & 75 of Appendix A.

Number of Truck Noise Measurements

Truck noise level measurements were taken in September through December of 1992, June through December of 1993, and July through August of 1994. Over this period, 1,430 individual truck noise measurements were taken at the 25 sites via 32 site visits. Two hundred thirty four

[5] Kessler, F.M. & Alexander, M., Sound Procedures for Measuring Highway Noise, Report No. FHWA-DP-45-1, Interim Report, May 1978, Federal Highway Administration, Region 15.

Site #	Route	Milepost
1	I78 W	4.8
2	I95 N	70.3
3	I287 N	17.4
4	I295 S	16.5
5	55 S	21.9
6	I78 W	10.7
7	I80 W	9.3
8	I78 W	28.7
11	I295 N	53.1
12	I78 E	20.3
13	I287 N	29.0
14	I-295 N	53.6
15	I-280 W	5.4
16	I80 W	9.5
17	33 W	19.3
19	202 N	6.6
20	130 N	74.2
21	206 N	19.1
22	206 N	60.6
24	31 N	34.3
25	22 E	23.3
26	206 S	84.4
28	46 W	22.9
29	31 N	31.5
30	31 S	34.3

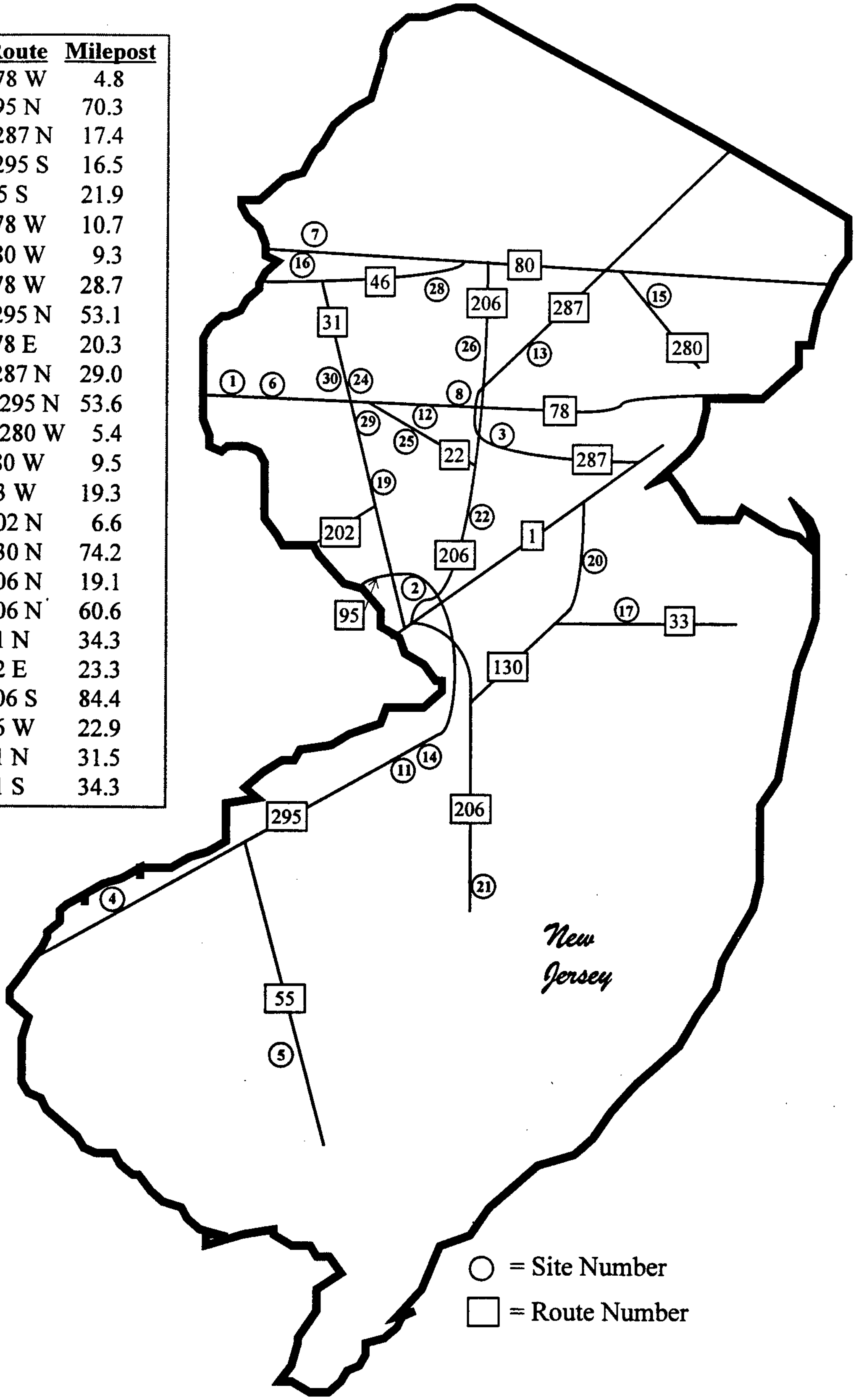


Figure 4. LOCATIONS OF MEASUREMENT SITES

Table 1. Number of Truck Noise Measurements

ROADWAY TYPE 1 Controlled Access (≤ 2% grade)			ROADWAY TYPE 4 Non-Controlled Access (≤ 2% grade)			ROADWAY TYPES 1& 4 (≤ 2% grade)	
Site Number	Site Visits	Measure-ments	Site Number	Site Visits	Measure-ments	Site Visits	Measure-ments
1	2	40	17	2	42		
2	3	58	19	1	64		
3	1	26	20	2	30		
4	1	46	21	1	40		
5	1	49					
Sub-Totals	8	219	Sub-Totals	6	176	14	395
ROADWAY TYPE 2 Controlled Access (> 2% upgrade)			ROADWAY TYPE 5 Non-Controlled Access (> 2% upgrade)			ROADWAY TYPES 2& 5 (> 2% upgrade)	
Site Number	Site Visits	Measure-ments	Site Number	Site Visits	Measure-ments	Site Visits	Measure-ments
6	2	47	22	1	29		
7	1	36	24	1	44		
8	2	59	25	1	42		
11	1	29					
Sub-Totals	6	171	Sub-Totals	3	115	9	286
ROADWAY TYPE 3 Controlled Access (> 2% downgrade)			ROADWAY TYPE 6 Non-Controlled Access (> 2% downgrade)			ROADWAY TYPES 2& 5 (> 2% downgrade)	
Site Number	Site Visits	Measure-ments	Site Number	Site Visits	Measure-ments	Site Visits	Measure-ments
12	1	39	26	1	28		
13	1	39	28	1	33		
14	1	26	29	1	27		
15	1	21	30	1	31		
16	1	49					
Sub-Totals	5	174	Sub-Totals	4	119	9	293
ROADWAY TYPES 1,2,& 3 Controlled Access			ROADWAY TYPES 4,5,& 6 Non-Controlled Access			ALL ROADWAY TYPES	
	Site Visits	Measure-ments		Site Visits	Measure-ments	Site Visits	Measure-ments
Totals	19	564		13	410	32	974

(234) of these measurements were immediately judged invalid in the field when vehicle spacing became too close or extraneous noise was present. So data reduction was done on 1,196 measurements. Another 222 measurements were found to be invalid during data reduction. Thus, 974 valid truck noise level measurements were obtained. The number of valid measurements is broken down by roadway type and site number in Table 1, Page 25. Site numbers correspond to those in Reference 1. Sites 2,16,19,21,& 25 are the replacement sites; Sites 9,10, 18,23, & 27 were not redone. Measurements were taken on Monday thru Friday; the majority, between 10 AM and 3 PM. Data collection was done by a two man field crew.

Table A-7, Appendix A, Page 76, shows the number of truck noise measurements for Roadway Types 1-6 broken down by the thirteen axle classifications defined on Page 14. Percentages of the total number of measurements are indicated if they are above 5%. This table indicates that over half (53.1%) of all the measurements were taken for Truck Classification 12, three axle tractors with two axle semitrailers. Nearly one quarter (23.2%) of all measurements were taken for Truck Classification 1, two axle trucks with dual tire rear wheels. Thus, 76.3% of all the measurements were taken for these two axle classifications. Noise measurements for two and three axle buses comprised only 1.7% of the total. With regard to the two general truck classes, 24.9% of all measurements were for medium trucks & buses; 75.1%, for heavy trucks. Note that for the controlled access roadway types, 19.6% of the measurements were for medium trucks & buses; while 80.4%, were for heavy trucks. In contrast, for non-controlled access roadway types, 32.2% of the measurements were for medium trucks & buses; while 67.8%, were for heavy trucks.

DATA REDUCTION

Truck noise, speed, and description data, and meteorological data that was collected at the 25 measurement sites was reduced in the lab or the office. A total of 1,196 truck noise level measurements were reduced; 222 were found to be invalid and were not analyzed. Some of the reasons data was discarded included: significant difference between start & end calibration signals, excessive wind, failure to meet the valid measurement criteria (6 dB rise & fall about maximum level), inadequate description of axle configuration and truck type, and extraneous noise detected when monitored with headphones. The final step in data reduction was to merge the noise, speed, and truck description data into a single computer file that could be utilized by the PC data analysis software. Following are the methods that were used to reduce the various types of data into a form suitable for data analysis.

Truck Noise Data

Two types of truck noise data were collected: digital and analog. Digital noise data was collected by the Larson-Davis Model 3200 1/3 octave real time analyzer. Analog noise data was collected with a Nagra IV-SJ tape recorder.

Digital Data

The Larson-Davis analyzer captured the maximum level from a truck passby and simultaneous 1/3 octave frequency information. A macro was run to store this data in the memory of the analyzer after it was decided that vehicle spacing throughout the passby was adequate and that extraneous noise was not present. When measurements were completed for the day, the data stored in memory was transferred to floppy disk via the analyzer's built in 1.44 MB drive. Back at the lab, a copy was made of the information on this floppy disk to prevent loss of data. Data for each measurement site was stored in a separately named file. The truck noise data stored on the floppy disk was in binary form, and as such, had to be converted to an ASCII format before it could be further reduced. Personal computer software purchased from Larson-Davis performed this conversion. It was called nVision Version 3.20 for Windows. The Exchange Function, which was used for the conversion, was not user friendly; indeed, every single truck passby spectrum had to be "dragged and dropped " into the Exchange window and stored in a unique file. Thus for a site with 50 truck passby measurements, 50 separate ASCII files were created which later were recombined into a single site file. To perform this combining operation more efficiently, a BASIC computer program was written. After running the BASIC program, an ASCII noise data file for each site was created which included the A-weighted maximum passby level, 1/3 octave frequency levels (from 25-20,000Hz), and the average speed for each truck.

Analog Data

While the noise from a truck passby was being sampled by the real time analyzer (RTA), it was simultaneously being recorded unweighted (Linear) on Channel 1 of a Nagra reel-to-reel tape recorder. One tape was used for each site visit. The recording was used to perform the valid measurement check, and to monitor the noise at the microphone for extraneous sounds.

For the valid measurement check, the recording was played into the Larson-Davis Model 3200 RTA, and then into a B & K 2305 Level Recorder. See Figure A-2, Page 73 for a list of the data reduction equipment. The RTA was used to A-weight the signal and for attenuation. The level recorder was used to produce a paper time history of each truck passby. This time history trace was examined to check that the target truck was sufficiently isolated from other highway traffic. A truck passby measurement was valid if the trace rose and fell at least 6 dB about the maximum passby level (See Reference 1, pages 151-157 for details). Passbys with time history traces which did not meet this criteria were discarded.

For monitoring the truck passby for extraneous noise, the tape recording was played into a pair of Koss headphones. In the field, the recording was made unweighted (linear setting) so that when it was monitored in the lab, an accurate sounding passby rendition was available to the listener. Before monitoring the truck passbys for a site, the operator reviewed field notes on extraneous noise, and annotations made about unusually shaped traces from the passby time history examination. If the listener heard extraneous noises (including wind noise) that he felt interfered with the proper measurement of the maximum passby level or judged that a truck was operating abnormally, the passby in question was discarded.

Truck Description Data

A description of each truck for which a noise measurement was made was announced on Channel 2 of the Nagra tape recorder using a microphone in the noise measurement van. Upon listening with headphones to Channel 2 in the lab, the operator wrote down the truck description on prepared forms using a system of codes and abbreviations for axle type, truck body type, etc. These truck descriptions were manually entered into computer files, one for each measurement site.

Meteorological Data

Data reduction for the weather data consisted primarily of the calculation of the wind speed vector perpendicular to the highway. This calculation was done utilizing the measured wind speed and direction. If the wind speed vector was greater than 7.5 miles per hour either towards or away from the microphone, then the passby measurement was discarded.

Speed Data

The Larson-Davis RTA calculated the average speed of a truck for the 500 foot interval having the microphone location at its center. The majority of the speed data was transferred directly from the analyzer using the nVision PC software as described under digital noise data on Page 99. However, because of software problems which erased the memory of the Larson-Davis RTA, digital noise and speed data measured in the field were lost for about 20% of the truck passbys. Because truck passby noise had been simultaneously tape recorded, the noise data was re-generated by playing the taped signal into the Larson-Davis RTA in the lab. Speed data, however, could not be restored.

Missing truck speeds were predicted by linear regression equations which were developed from the known speeds for the other 80% of the trucks measured. Development of these equations was based on the observation that the time history trace from the level recorder was narrower when speeds were higher. In other words, it took less time for the passby noise level to drop 10 dB below maximum level for higher speeds. The linear regression equations related speed (dependent variable) to the following independent variables: (1) maximum level, (2) distance measured across the passby trace at 10 dB down from the maximum level [a function of the time to drop 10 dB], and (3) wind speed perpendicular to the highway. Linear, quadratic, and cubic forms of these independent variables, in various combinations, were used to derive an equation which provided the best fit for the known speed data. Prediction equations had from 4 to 6 independent variable terms. Separate prediction equations were derived for 2, 3, 4, & 5 axle trucks, and for both level and upgrade roadway sections. (No speed data was missing for downgrade roadways.) Across all axle types and roadway types, the mean residual for the prediction equations was about 2.5 miles per hour, and the R-square value was approximately 0.67.

As mentioned, this method of predicting speeds included a variable referenced to a 10 dB rise and fall about the maximum passby level; consequently, truck passbys for which speeds were predicted, had to meet a stricter standard of vehicle isolation than the passbys with known speeds (6 dB rise & fall, see Page 18). This more stringent isolation requirement for speed prediction resulted in the discarding of truck noise measurements that would otherwise have been suitable for data analysis.

Merging of Data

Truck noise, speed, and description data were merged into a single computer file for each site using the SAS System for Windows software package.* At this point a detailed list was drawn up of truck passbys which were to be discarded. These "bad" truck measurements were deleted from each site file using an editor (KEDIT Version 4.00D1). Most of the reasons that truck noise data was discarded have already been mentioned; but two additional reasons for discarding

* SAS Institute Inc., SAS Circle, Box 8000, Cary, North Carolina, 27512-8000.

data were incomplete 1/3 octave spectra (low frequency bands missing data) and two truck passbys within the RTA sampling period (a maximum level was captured, but it was for the wrong truck). Again using SAS, data from the site files was manipulated to create twelve files encompassing the two general truck classes and six roadway types. All data was now sufficiently reduced and in the proper form for data analysis to begin.

DATA ANALYSIS

The truck noise and speed data were analyzed using the SAS statistical analysis personal computer software. Various graphical and numerical methods were used ranging from scatter plots to nonparametric rank statistics. Data was analyzed initially on a site by site and specific axle classification basis; then for roadway type and general truck class groups.

Site by Site

For each of the 25 sites, elementary statistics were calculated for truck speed and the maximum A-weighted passby level of a truck (L_{MaxA}). These statistics were calculated for each of the thirteen axle classifications described on Page 14. Data for the sites within each of the six roadway types was compared to determine if inconsistent results occurred for any particular site. Mean, median, minimum, and maximum statistics were mainly used for this comparison. Energy means of the L_{MaxA}'s were also utilized. In examining these statistics, we concluded that all noise level and speed differences between sites could be reasonably explained.

Truck Class - Roadway Type Groups

Elementary Statistics

Elementary statistics were also calculated for the general truck classes -- (1) medium trucks & buses and (2) heavy trucks -- for each of the six roadway types. In addition to basic statistics, frequency histograms, stem & leaf plots, normal probability plots, and schematic plots were done for L_{MaxA} and truck speed for each of the truck class - roadway type combinations. Energy mean

L_{MaxA} noise levels were also calculated. For each grouping, scatter plots of L_{MaxA} versus truck speed were done, and a measure of normality, the Shapiro-Wilk statistic, was calculated.

Regression Analysis

Linear regression analysis of L_{MaxA} versus Log_{10} of truck speed (mph) was completed for each truck class - roadway type group. All of the data in a group was used for the regression analysis; i.e., data was not segregated into speed intervals. The analysis yielded the values of the regression equation coefficients as well as other statistics such as R^2 and Root MSE. From these regression equations, the Reference Energy Mean Emission Level (REMEL) was calculated under the assumption of normally distributed L_{MaxA}'s. To compare the results of this update study (1992-94) to those for the original truck noise study (1977), the regression lines determined for the two studies were plotted on a graph for each truck class and roadway type group. Plots were done of the regression lines for REMEL versus truck speed and L_{MaxA} versus truck speed. These twenty four graphs provided a direct visual comparison of past and present truck noise levels on a speed basis (See Figures 5-16, Pages 41-53, and Figures B-1 thru B-12, Pages 78-89).

Distribution-Free Rank Sum Test - Special Analysis Method

In addition to the graphical analysis of truck noise emission levels, we decided to take a more rigorous approach, and compare this data using a statistical test. Since some of the L_{MaxA}'s for truck class - roadway type groups were not normally distributed, a nonparametric test was selected. Hence, the Wilcoxon Rank Sum Test (WRST) was utilized to compare truck noise level and corresponding speed data for the various truck class - roadway type groups to determine if the data from 1977 and 1992-94 came from the same populations. If they didn't, then the estimated population shift, with associated two-sided 95% confidence interval, was determined as in Reference 6.[6]

In order to again compare truck noise level data on a speed basis, the statistical testing was done in the following manner for each truck class - roadway type group:

(1) 1977 and 1992-94 speeds were compared using the WRST. If they were found to be from the same population, then we proceeded directly to Step (6). If they were from different populations, then Steps 2 thru 5 were followed.

(2) The population shift for the truck speed data was determined. This population shift (e.g., 2 mph) was added to all of the speeds for one set of data, and the WRST was run again to verify that both sets of speed data were now from the same population.

(3) The population shift added to the speed data set was then used to adjust the corresponding L_{MaxA} data set. The linear regression equation determined for L_{MaxA} versus Log_{10} of speed provided the amount of adjustment.

(4) Using the regression equation, the predicted L_{MaxA} for the true speed was determined, then the predicted L_{MaxA} for the adjusted speed was determined. The difference between the L_{MaxA}'s for these two speeds was the amount of adjustment which was added to (or subtracted from) the true measured L_{MaxA}. Each measured truck noise level was adjusted individually by the above method. Thus the amount that an L_{MaxA} was adjusted was different for each speed because of the logarithmic nature of the regression equation.

[6] Hollander, M., and Wolfe, D.A., Nonparametric Statistical Methods, Chapter 4, pages 67-82.

(5) Using the WRST, the measured L_{MaxA}'s from one data set (e.g., 1977) were compared to the adjusted L_{MaxA}'s for the other data set (e.g., 1992-94), to determine if they were from the same population. If they were not, then the population shift and its 95% confidence interval were determined.

(6) The WRST was used to compare the measured L_{MaxA} 's for 1977 & 1992-94 to determine if they were from the same population. If they were not, then the population shift and its 95% confidence interval were determined.

The elementary statistics, and the findings of the regression analyses and the nonparametric statistical tests for truck noise levels and speeds are presented in the following section.

RESULTS AND DISCUSSION

Elementary Statistics

Table 2 on Page 38 presents the summary statistics for Truck Classes 1 & 2 for all six of the roadway types. For trucks on controlled access highways, this table shows that, though median speeds were nearly the same (within 1 mph), median noise levels for Heavy Trucks were about 2-4 dBA higher than for Medium Trucks & Buses; and energy mean noise levels, about 3-4 dBA higher. For trucks on non-controlled access highways, the table indicates that median noise levels for Heavy Trucks were about 3-3.5 dBA higher than for Medium Trucks & Buses; and energy mean noise levels about 3-5.5 dBA higher. It should be noted however, that median speeds for Truck Classes 1 & 2 varied considerably for non-controlled access highways.

Table 2 also shows that significantly more measurements were taken for Heavy Trucks -- roughly four times as many as for Medium Trucks & Buses for controlled access highways; and twice as many, for non-controlled access highways. In addition, this table indicates that based on the Shapiro-Wilk test for normality at the 90% confidence level, truck noise levels for the twelve Roadway Type-Truck Class groups are from normal populations just 50% of the time.

Comparison of 1977 and 1992-94 N.J. Truck Noise Levels

Regression Analysis

For the 1992-94 truck noise data, linear regression analysis of L_{MaxA} versus Log_{10} of speed (mph) was completed for Truck Class 1 (Medium Trucks & Buses) and Truck Class 2 (Heavy Trucks) for each of the six roadway types. This analysis used an equation of the form:

$$\overline{L_{MaxA}} = A + B * Log_{10}(Speed),$$

Table 2. Summary Statistics for N.J. Truck Classes 1 & 2 (1992-94)

	TRUCK CLASS 1 (Medium Trucks & Buses)							TRUCK CLASS 2 (Heavy Trucks)						
ROADWAY TYPE	Number	Mean L_{MaxA}	Median L_{MaxA}	Energy Mean L_{MaxA}	Mean Speed	Median Speed	Normal L_{MaxA}*	Number	Mean L_{MaxA}	Median L_{MaxA}	Energy Mean L_{MaxA}	Mean Speed	Median Speed	Normal L_{MaxA}
1 CA, Level	48	78.7	79.1	79.5	50.3	50	Yes	171	82.5	82.4	83.0	49.9	49	No
2 CA, Upgrade	32	78.6	79.5	79.5	50.2	51	No	137	81.5	81.4	82.4	48.0	50	No
3 CA, Downgrade	29	78.4	78.3	79.4	57.2	57	Yes	139	82.3	82.4	83.2	58.0	58	Yes
4 NCA, Level	51	77.6	77.7	78.4	49.2	49	Yes	125	81.2	81.0	82.1	48.2	48	Yes
5 NCA, Upgrade	42	79.0	78.6	80.0	48.3	48	No	73	82.1	82.0	83.2	45.3	45	No
6 NCA, Downgrade	39	76.8	77.3	77.7	50.4	52	Yes	80	80.9	80.6	83.3	46.9	46	No

CA= Controlled Access NCA= Non-controlled Access All noise levels in dBA. All speeds in miles per hour. * Shapiro-Wilk statistic @ 90 % confidence level where L_{MaxA} is the dependent variable (the arithmetic average maximum passby truck noise level) in dBA, Log_{10} (Speed) is the independent variable in mph, and A & B are constants (i.e., the regression coefficients). As well as calculating the regression coefficients, the regression analysis determined other statistics such as R^2 and Root MSE. As with the 1977 data, values of R^2 were low, averaging roughly 0.10 to 0.15. Thus on average, speed explained less than a quarter of the variation in the L_{MaxA} 's.

Truck Reference Energy Mean Emission Levels (REMEL's)

Truck REMEL's were calculated according to the equation shown below:

$$\text{REMEL} = \overline{L_{MaxA}} + 0.115 * (\text{Root MSE})^2$$

This is the same method used to calculate the REMEL's for the 1977 data; however, it assumes that the L_{MaxA} 's are normally distributed. The 1992-94 REMEL equations for the two truck classes and six roadway types are given in the table below. For the REMEL equations for 1977, see Reference 1.

Table 3. N.J. Truck REMEL Equations 1992-1994

ROADWAY TYPE	TRUCK CLASS 1 (Medium Trucks & Buses)	TRUCK CLASS 2 (Heavy Trucks)
1 CA, Level	$57.81 + 12.79 * \text{Log}_{10}$ (Speed)	$61.71 + 12.50 * \text{Log}_{10}$ (Speed)
2 CA, Upgrade	$59.08 + 12.18 * \text{Log}_{10}$ (Speed)	$68.27 + 8.32 * \text{Log}_{10}$ (Speed)
3 CA, Downgrade	$23.16 + 31.90 * \text{Log}_{10}$ (Speed)	$30.18 + 29.97 * \text{Log}_{10}$ (Speed)
4 NCA, Level	$68.65 + 5.75 * \text{Log}_{10}$ (Speed)	$76.97 + 2.96 * \text{Log}_{10}$ (Speed)
5 NCA, Upgrade	$69.16 + 6.35 * \text{Log}_{10}$ (Speed)	$64.85 + 10.91 * \text{Log}_{10}$ (Speed)
6 NCA, Downgrade	$33.77 + 25.76 * \text{Log}_{10}$ (Speed)	$52.73 + 17.58 * \text{Log}_{10}$ (Speed)

CA= Controlled Access NCA= Non-controlled Access Noise levels in dBA. Speeds in miles per hour.

Figures 5-10 on Pages 41-46 compare the 1992-94 REMEL's to the 1977 REMEL's for Medium Trucks & Buses for each roadway type. Figures 11-16 on Pages 48-53 compare 1992-94 REMEL's to the 1977 REMEL's for Heavy Trucks for each roadway type. Figures B-1 to B-12, Appendix B, Pages 78-89, compare the 1977 & 1992-94 regression lines for noise emission level (L_{MaxA}) versus speed for the two truck classes and six roadway types. Figures B-1 to B-12 also show scatterplots of the L_{MaxA} truck data for 1992-94. For all 24 of these figures, the speed range of the plots is the speed range of the 1992-94 truck data. (Note: Mean truck speeds for the 1992-94 data were roughly the same as for the 1977 data.)

REMEL's - Medium Trucks & Buses

Figures 5 to 10 indicate that, across all roadway types, the REMEL's for 1992-94 were lower than the REMEL's for 1977 for essentially all speeds. The table below indicates how much lower, for a truck speed of 50 miles per hour. As you can see, the 1992-94 REMEL's for Medium Trucks & Buses were 2.1-4.0 dBA lower than the 1977 REMEL's.

Table 4. REMEL Comparison for Medium Trucks & Buses @ 50 Mph

Roadway Type	1977 REMEL (dBA)	1992-94 REMEL (dBA)	Difference (1977 minus 1992-94) (dBA)
1 CA, Level	82.5	79.5	3.0
2 CA, Upgrade	82.7	79.8	2.9
3 CA, Downgrade	81.4	77.4	4.0
4 NCA, Level	80.5	78.4	2.1
5 NCA, Upgrade	83.0	79.9	3.1
6 NCA, Downgrade	80.1	77.5	2.6

CA= Controlled Access NCA= Non-controlled Access

Figure 5: REMEL vs. Truck Speed
ROADWAY TYPE 1 (Controlled Access, Level) – MEDIUM TRUCKS & BUSES

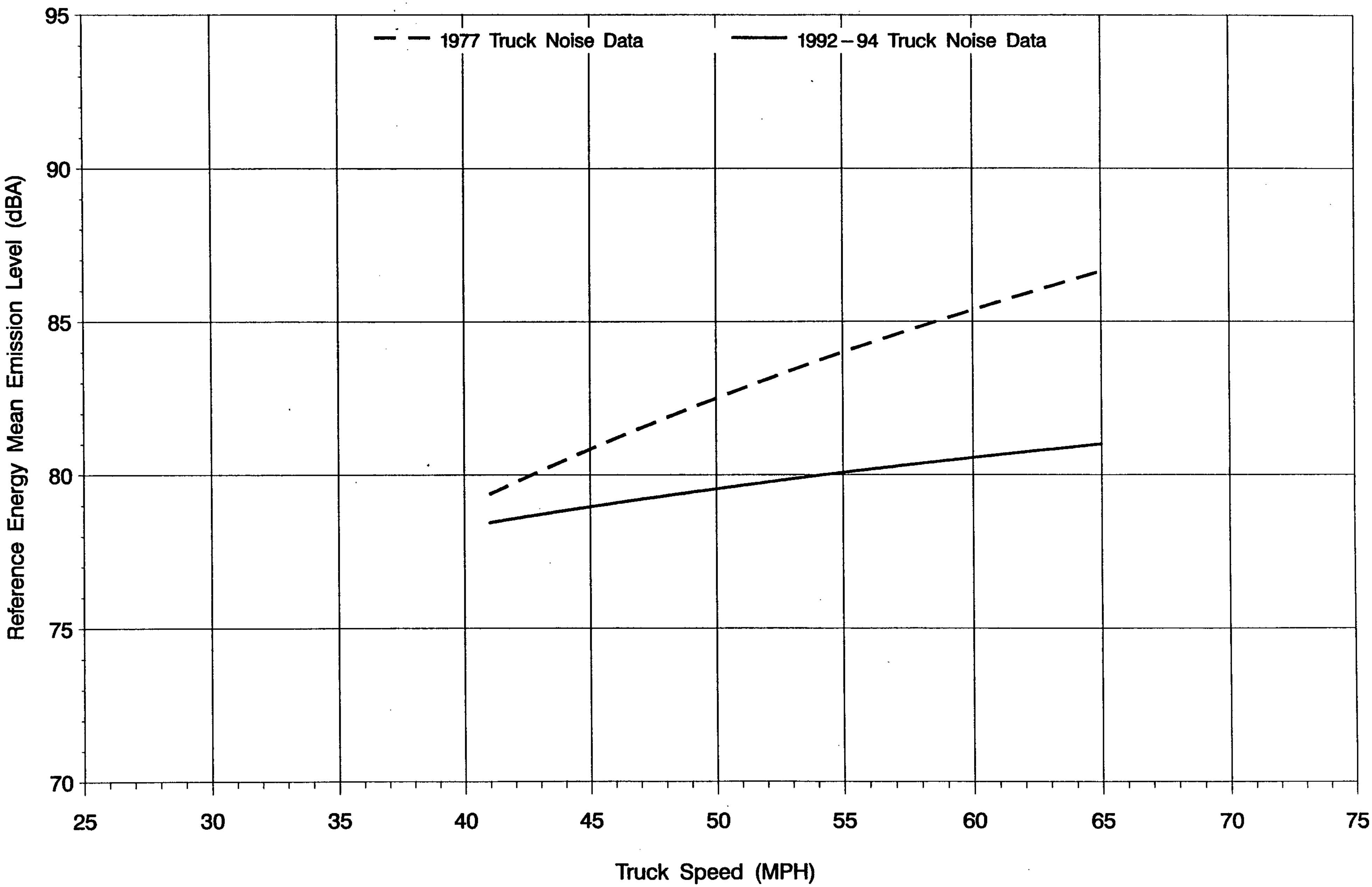


Figure 6: REMEL vs. Truck Speed
ROADWAY TYPE 2 (Controlled Access, Upgrade) – MEDIUM TRUCKS & BUSES

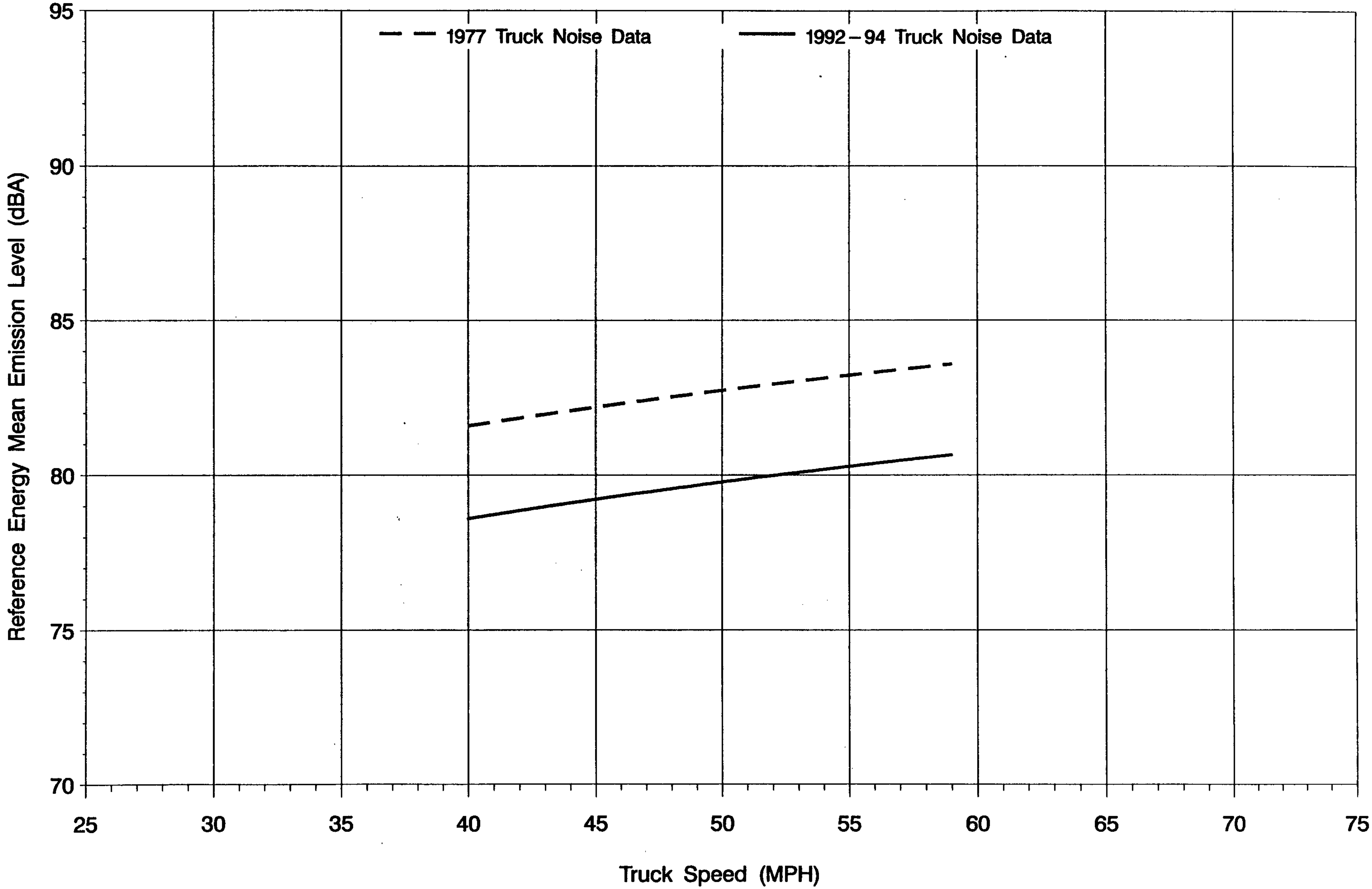


Figure 7: REMEL vs. Truck Speed
ROADWAY TYPE 3 (Controlled Access, Downgrade) – MEDIUM TRUCKS & BUSES

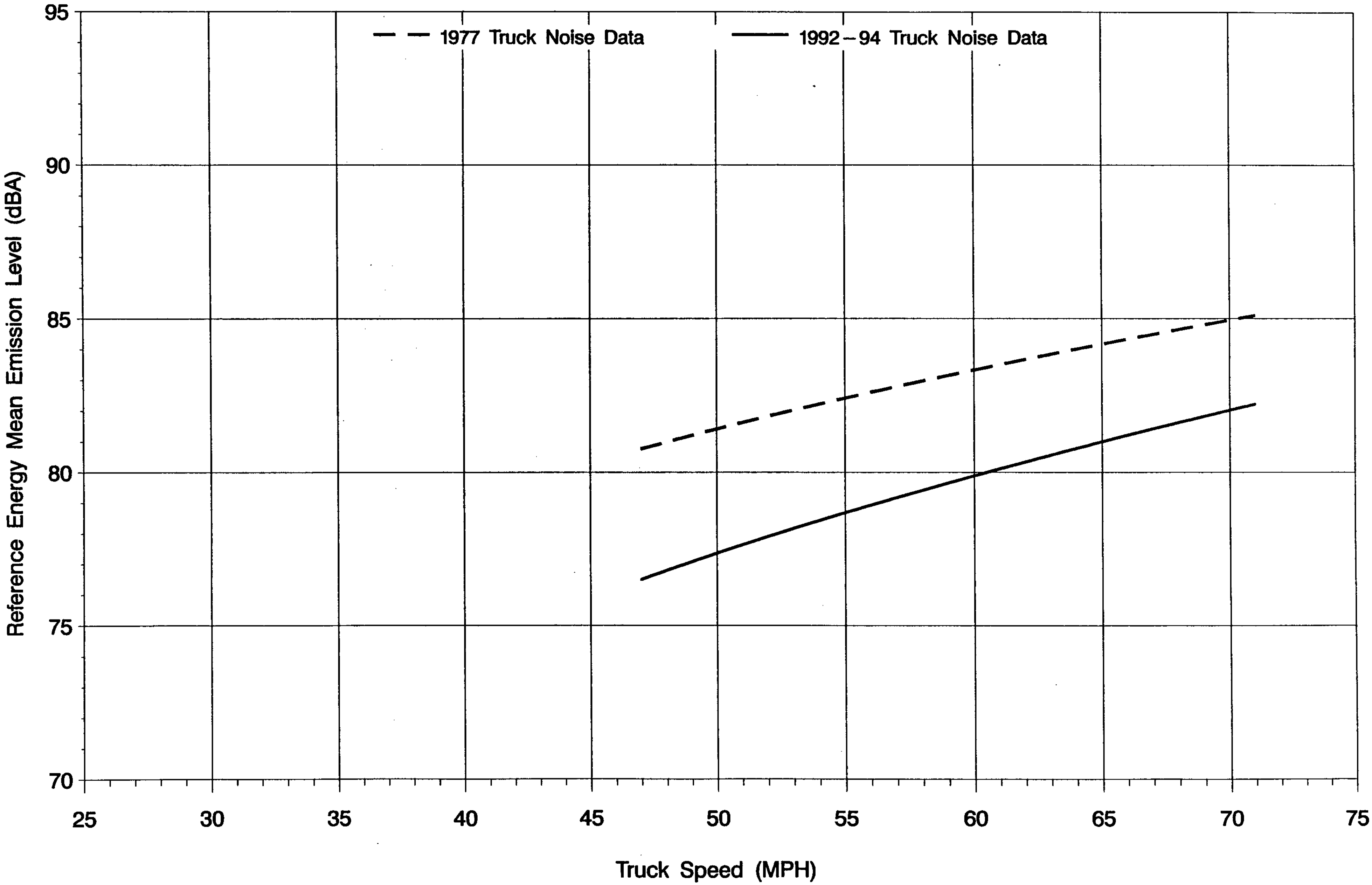


Figure 8: REMEL vs. Truck Speed
ROADWAY TYPE 4 (Non-Controlled Access, Level) - MEDIUM TRUCKS & BUSES

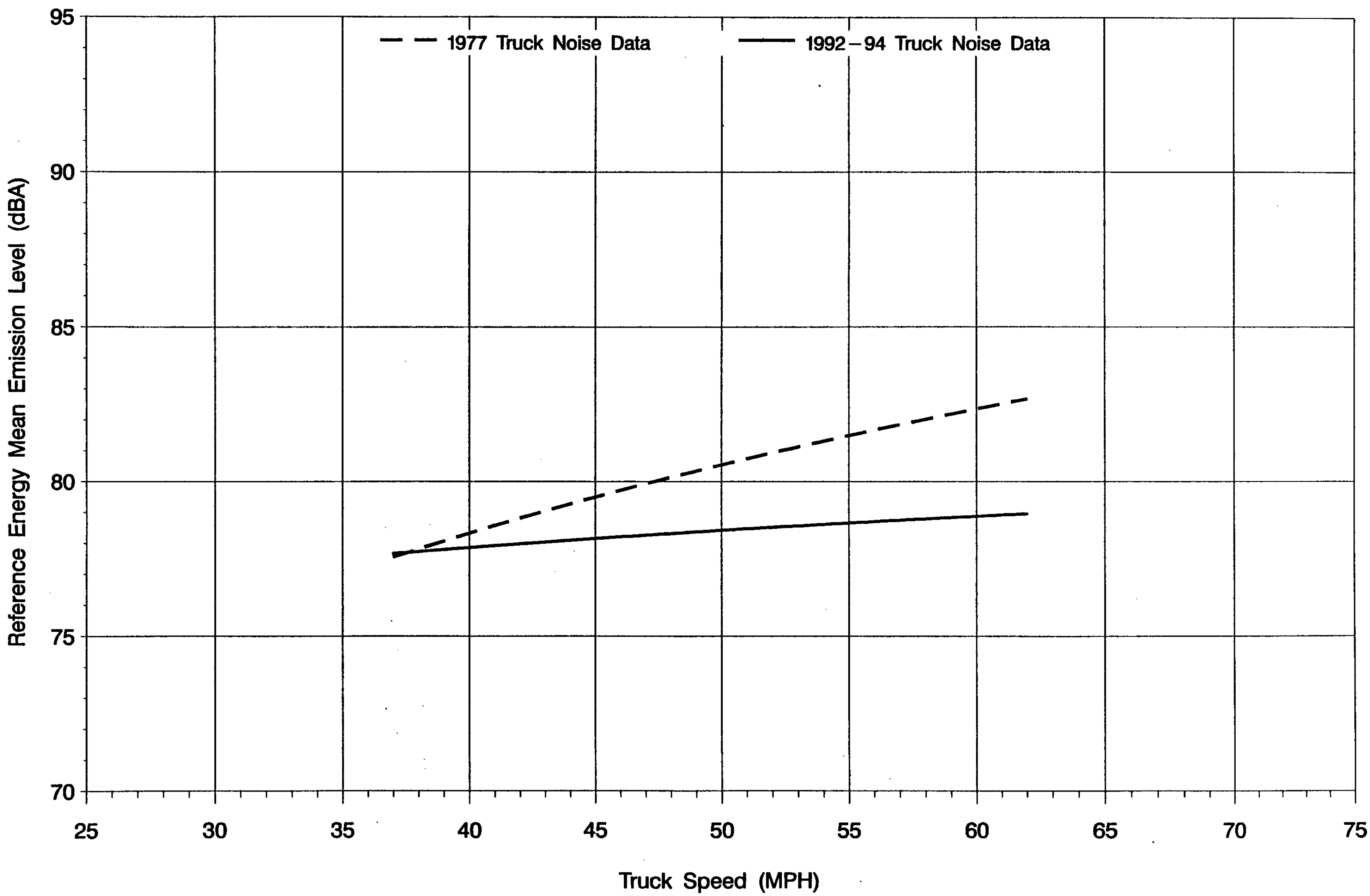


Figure 9: REMEL vs. Truck Speed
ROADWAY TYPE 5 (Non-Controlled Access, Upgrade) – MEDIUM TRUCKS & BUSES

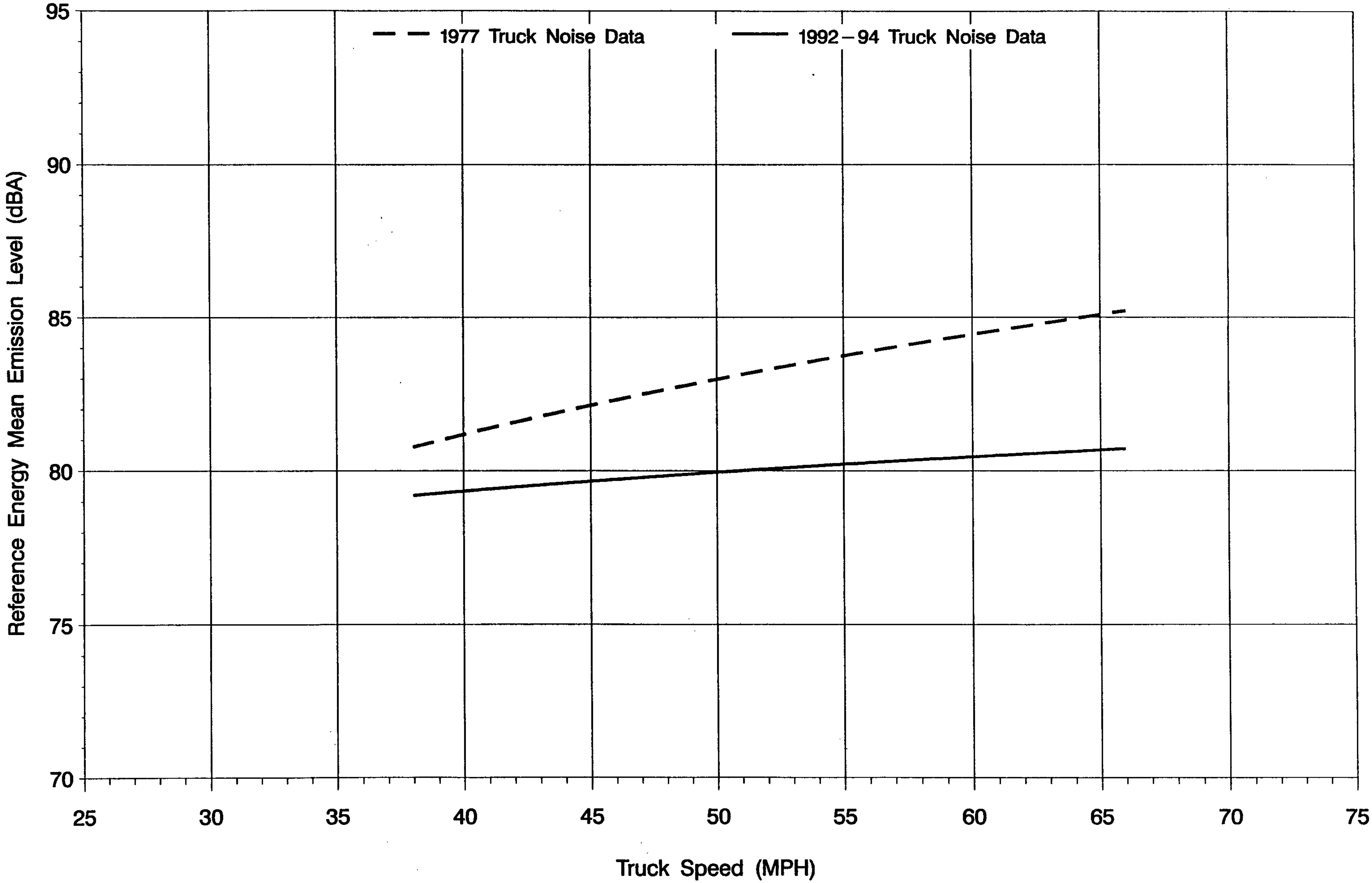
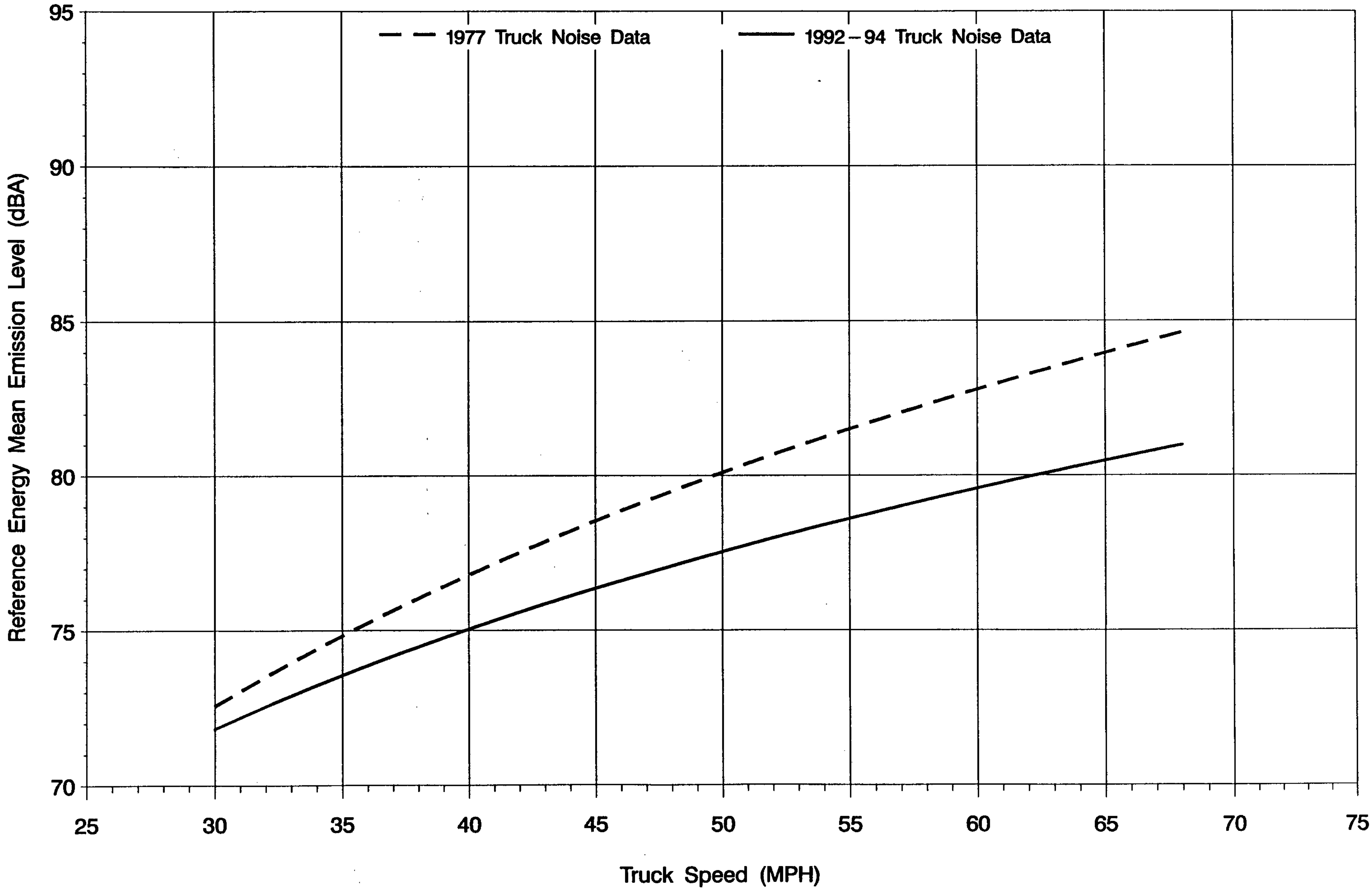


Figure 10: REMEL vs. Truck Speed
ROADWAY TYPE 6 (Non-Controlled Access, Downgrade) – MEDIUM TRUCKS & BUSES



REMEL's - Heavy Trucks

Figures 11 to 16 indicate that, across all roadway types, the REMEL's for 1992-94 were lower than the REMEL's for 1977 for essentially all speeds. The table below indicates how much lower, for a truck speed of 50 miles per hour. As you can see, the 1992-94 REMEL's for Heavy Trucks were 1.9-5.0 dBA lower than the 1977 REMEL's.

Table 5. REMEL Comparison for Heavy Trucks @ 50 Mph

Roadway Type	1977 REMEL (dBA)	1992-94 REMEL (dBA)	Difference (1977 minus 1992-94) (dBA)
1 CA, Level	86.7	82.9	3.8
2 CA, Upgrade	87.4	82.4	5.0
3 CA, Downgrade	85.0	81.1	3.9
4 NCA, Level	84.7	82.0	2.7
5 NCA, Upgrade	87.3	83.4	3.9
6 NCA, Downgrade	84.5	82.6	1.9

CA= Controlled Access NCA= Non-controlled Access

Special Analysis Method - Distribution-Free Rank Sum Test

In addition to comparing the REMEL equations for the 1977 and 1992-94 truck noise data, we decided to take a more rigorous approach and perform a statistical test to compare the actual truck noise level (L_{MaxA}) data collected for the two periods. Since about 50% of the L_{MaxA} data for the truck class - roadway type groups was not normally distributed (see Table 2, Page 38), a non-parametric (distribution-free) test was chosen. Accordingly, the Wilcoxon Rank Sum Test (WRST) was utilized to determine if the truck noise level data for 1977 and 1992-94 came from the same populations. Truck noise level and corresponding speed data for each truck class -

Figure 11: REMEL vs. Truck Speed
ROADWAY TYPE 1 (Controlled Access, Level) – HEAVY TRUCKS

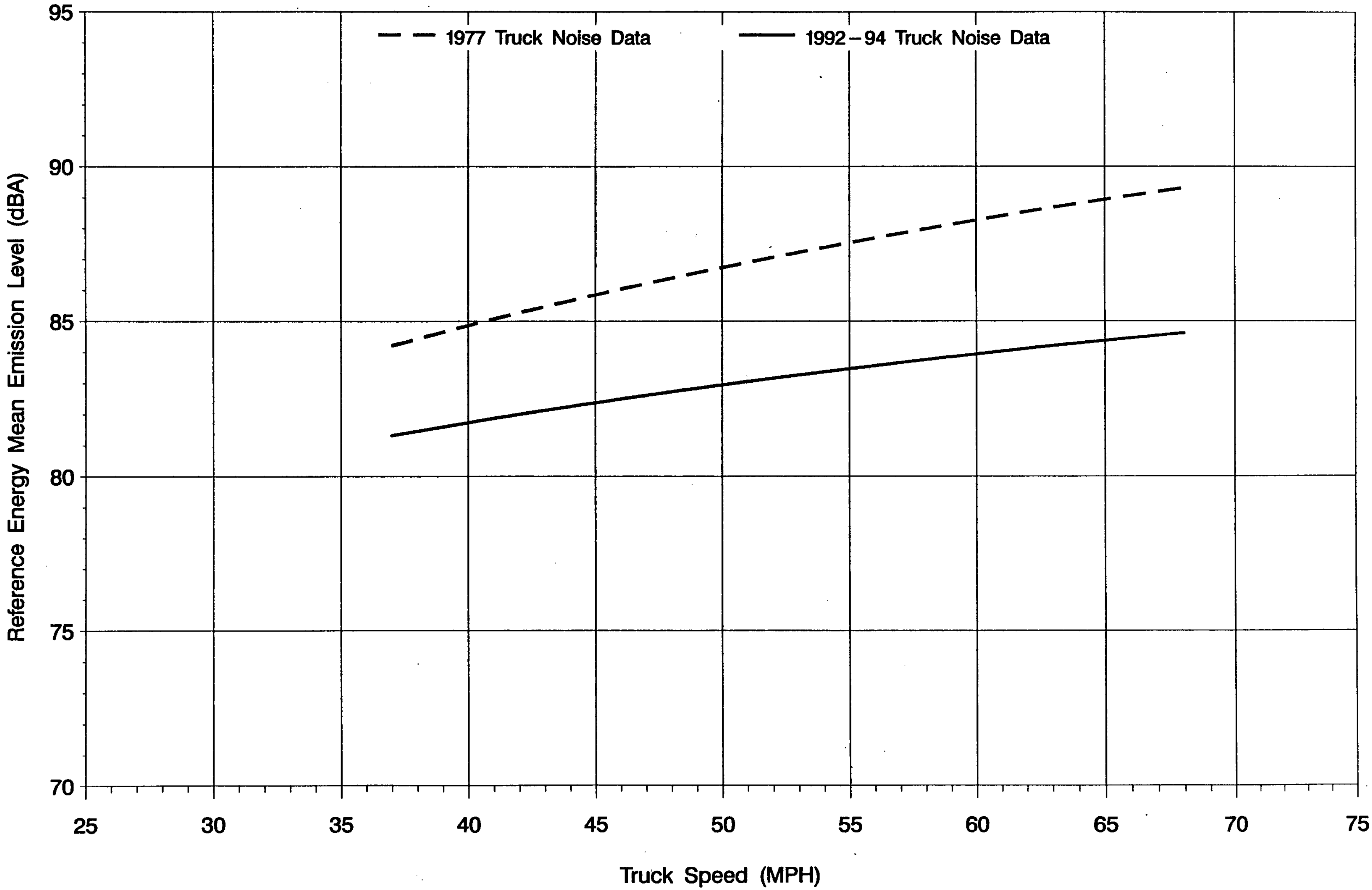


Figure 12: REMEL vs. Truck Speed
ROADWAY TYPE 2 (Controlled Access, Upgrade) – HEAVY TRUCKS

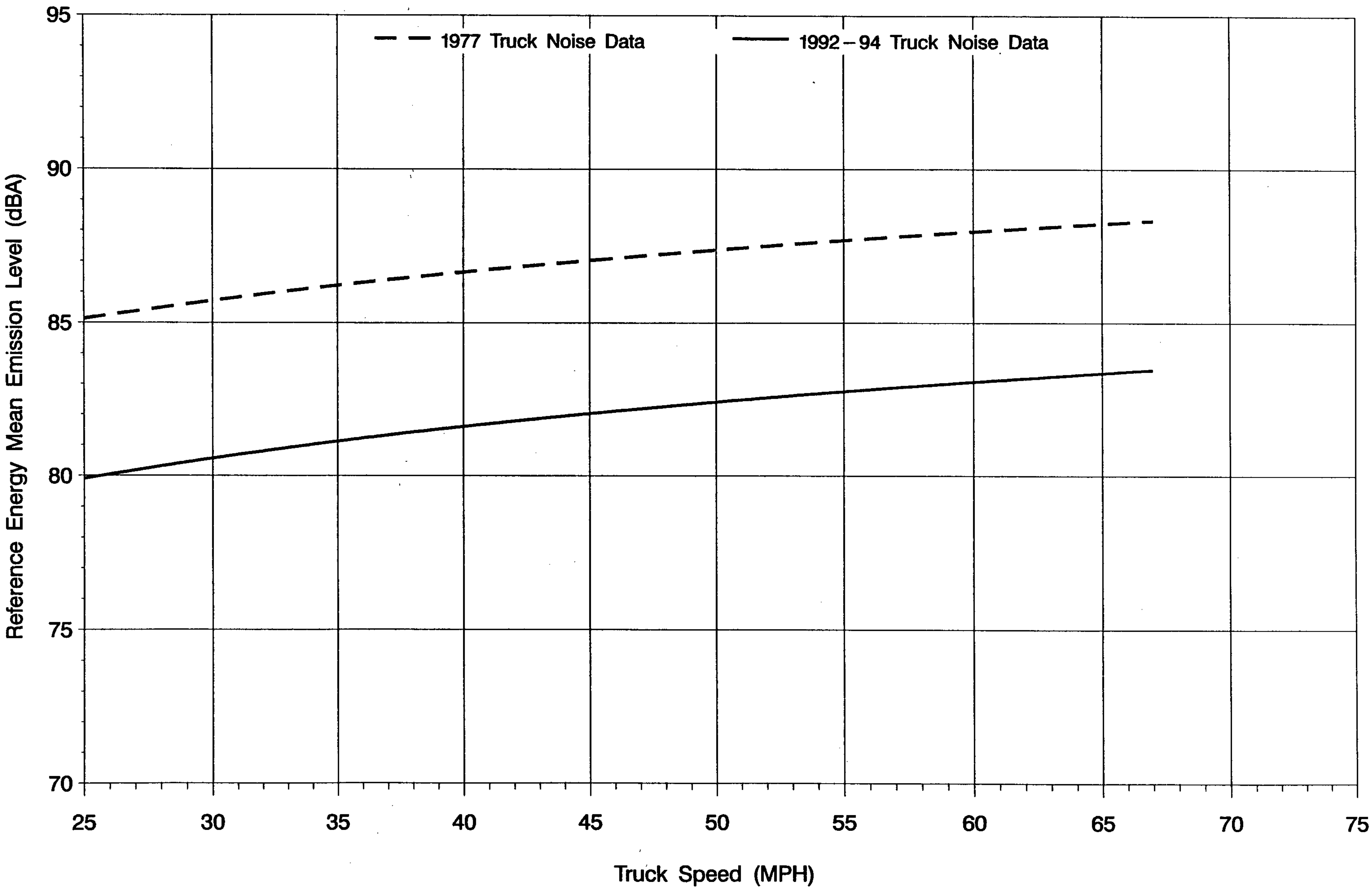


Figure 13: REMEL vs. Truck Speed
ROADWAY TYPE 3 (Controlled Access, Downgrade) — HEAVY TRUCKS

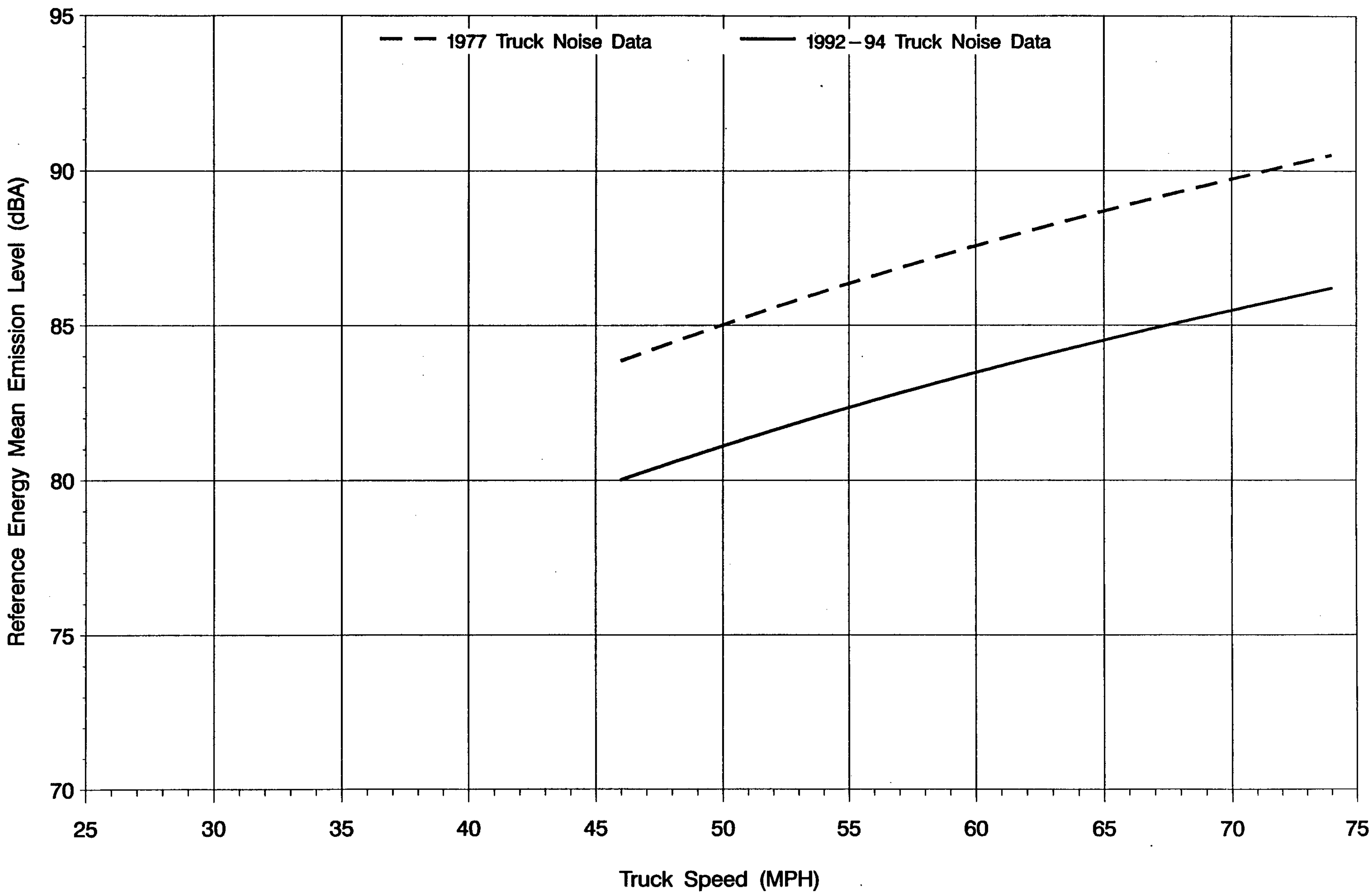


Figure 14: REMEL vs. Truck Speed
ROADWAY TYPE 4 (Non-Controlled Access, Level) - HEAVY TRUCKS

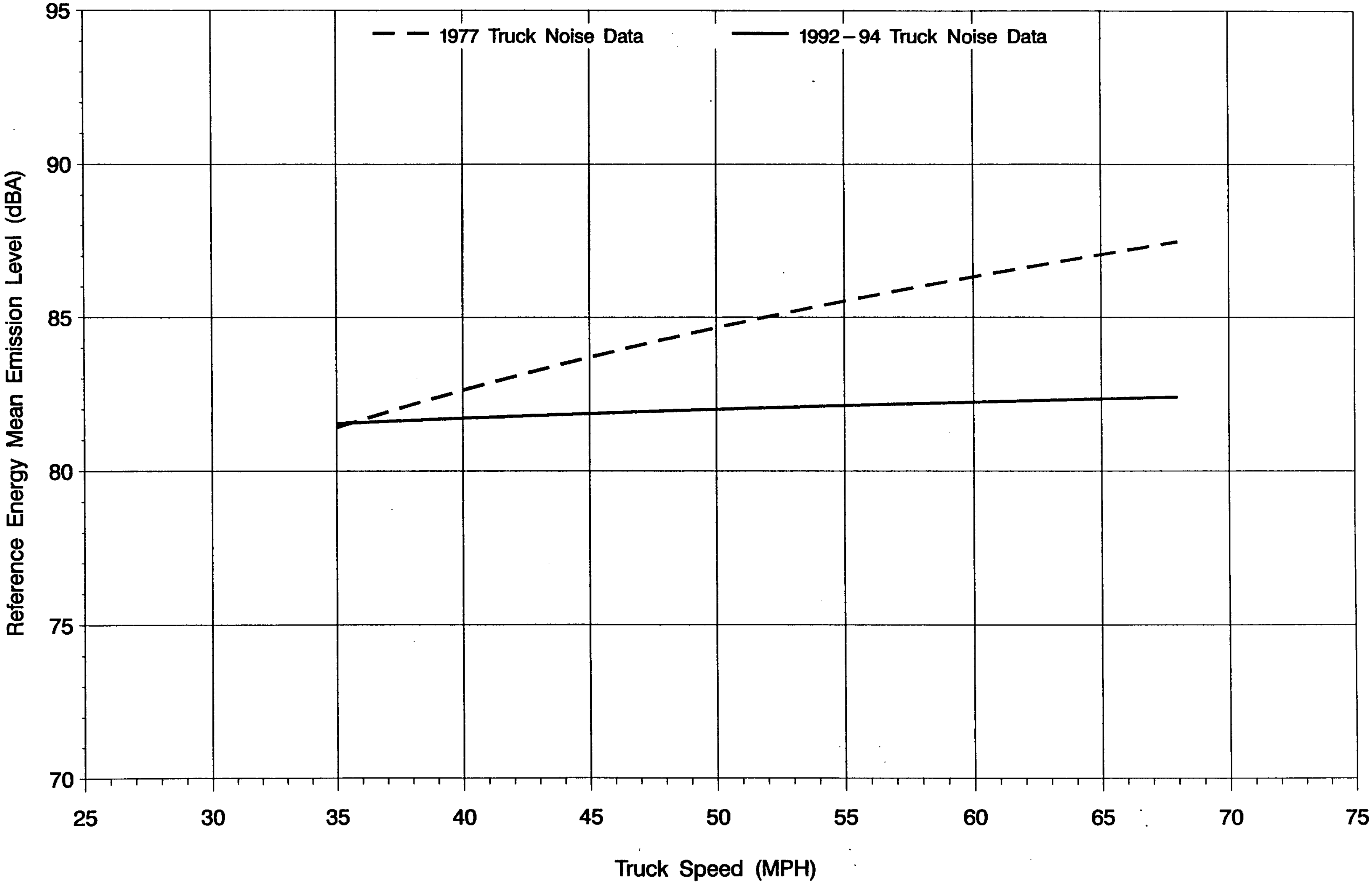


Figure 15: REMEL vs. Truck Speed
ROADWAY TYPE 5 (Non-Controlled Access, Upgrade) - HEAVY TRUCKS

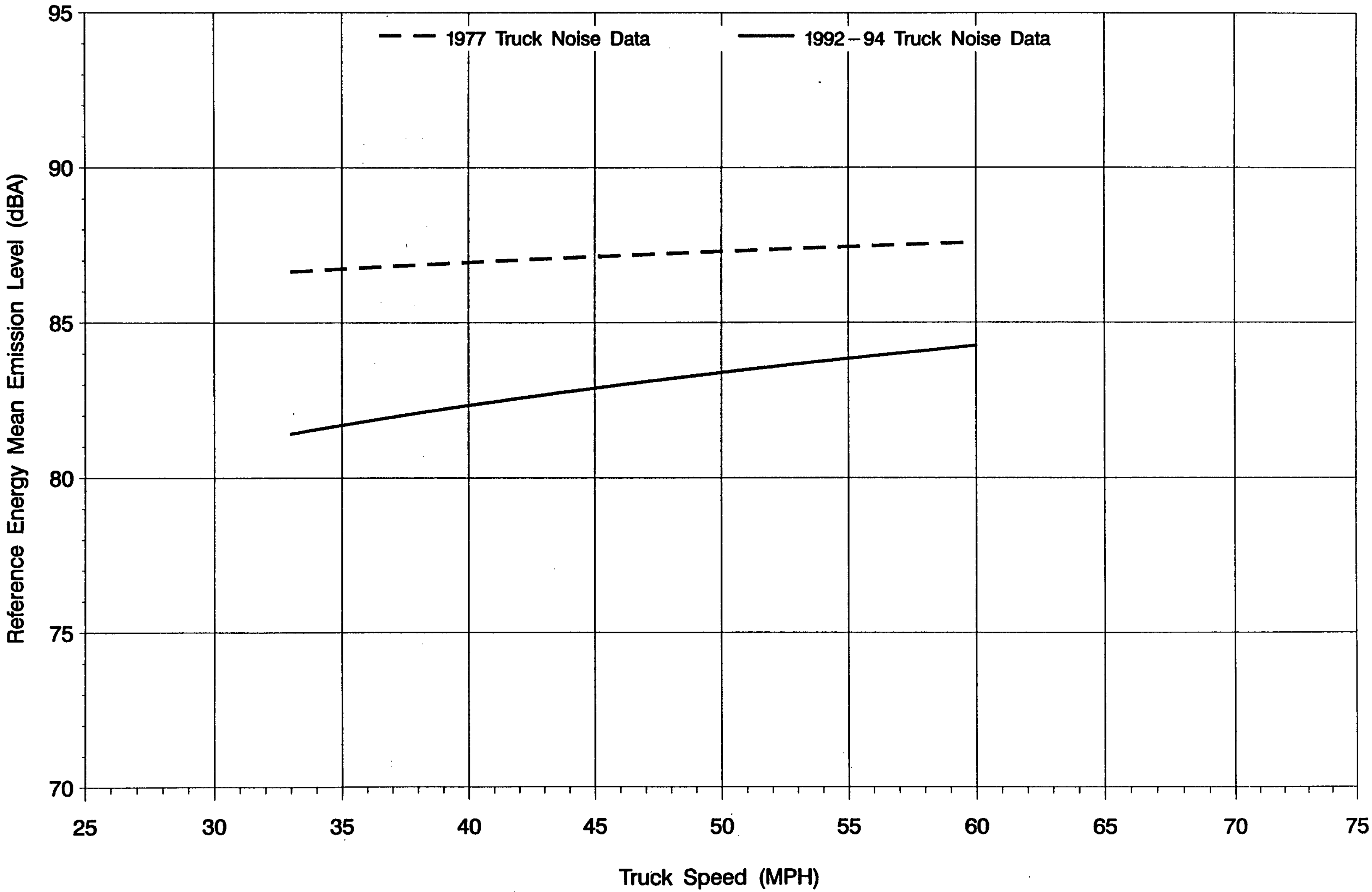
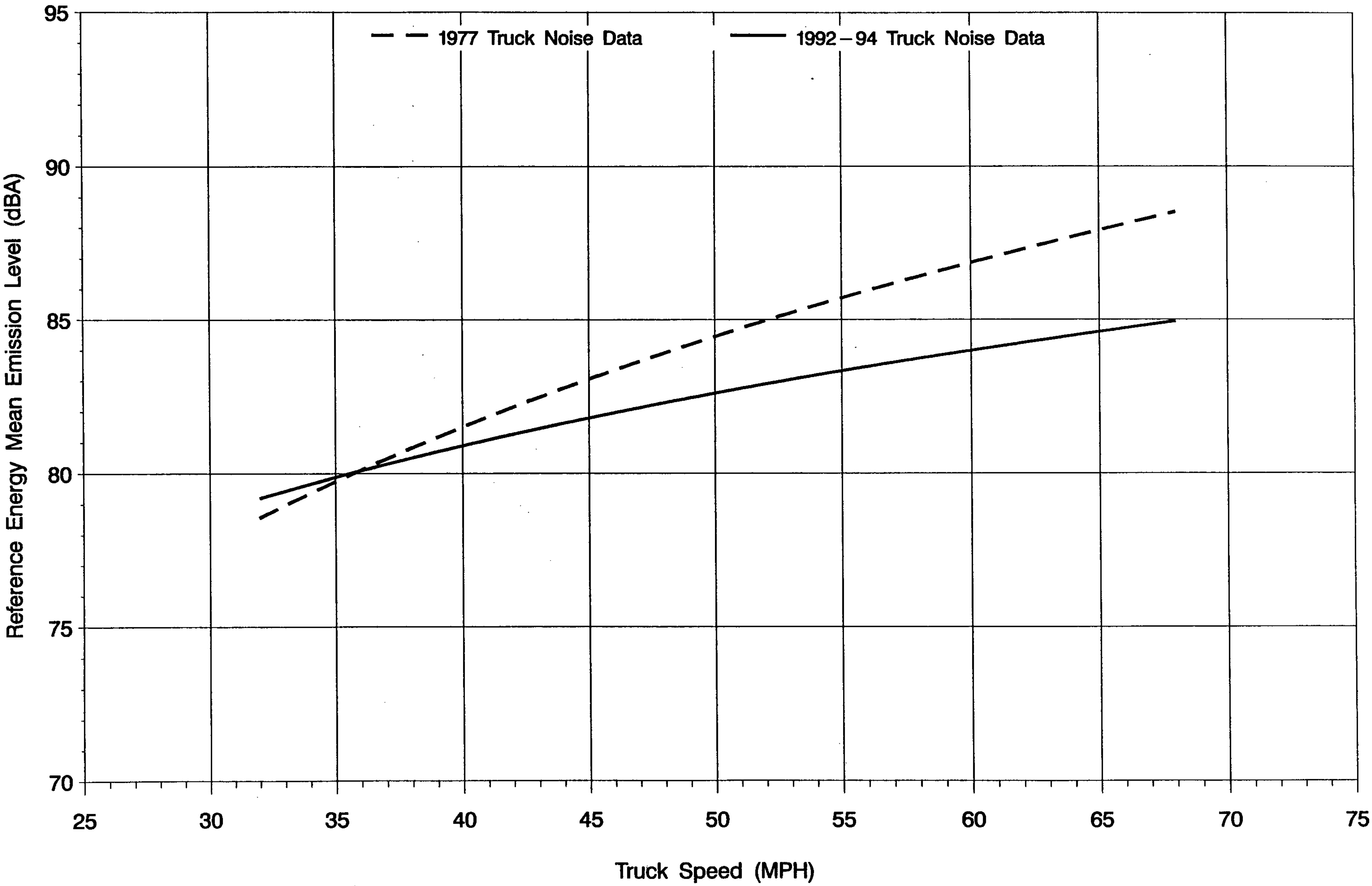


Figure 16: REMEL vs. Truck Speed
ROADWAY TYPE 6 (Non-Controlled Access, Downgrade) – HEAVY TRUCKS



roadway type group were compared using the special analysis method described on Pages 34-36. If the WRST indicated that the 1977 and 1992-94 truck noise level data were from different populations, then the estimated population shift, with associated two sided 95% confidence interval was determined as in Reference 6. The results from this statistical testing are given in Tables 6 & 7, on this and the following page.

Medium Trucks & Buses

As shown in Table 6, for all roadway types, the 1992-94 truck noise level data came from a different population than the 1977 truck noise data. For Medium Trucks & Buses, the 1992-94 truck noise levels were lower than the 1977 truck noise levels by from 1.5 to 3.2 dBA. On average, 1992-94 medium truck & bus noise levels were 2.3 dBA lower than the 1977 levels across all roadway types. For controlled access roadways, 1992-94 levels averaged 2.9 dBA lower than 1977 levels; for non-controlled access roadways, 1.7 dBA lower.

Table 6. Medium Trucks and Buses - 1977 vs. 1992-94 Data
Results of Non-parametric Statistical Analysis

	Number of Measurements		Different	**Population Shift (dBA)**
Roadway Type	1977	1992-94	Populations	95% Confidence Interval
1 CA, Level	127	48	YES	$2.3 \leq$ **3.2** ≤ 4.3
2 CA,Upgrade	109	32	YES	$1.4 \leq$ **2.6** ≤ 3.8
3 CA, Downgrade	132	29	YES	$1.4 \leq$ **2.8** ≤ 4.0
4 NCA, Level	224	51	YES	$0.6 \leq$ **1.5** ≤ 2.4
5 NCA, Upgrade	126	42	YES	$0.5 \leq$ **1.6** ≤ 2.8
6 NCA,Downgrade	256	39	YES	$1.0 \leq$ **2.1** ≤ 3.2

CA= Controlled Access NCA= Non-controlled Access

Heavy Trucks

As shown in Table 7, for all roadway types, the 1992-94 truck noise level data came from a different population than the 1977 truck noise data. For Heavy Trucks, the 1992-94 truck noise levels were lower than the 1977 truck noise levels by from 2.1 to 4.8 dBA. On average, 1992-94 heavy truck noise levels were 3.5 dBA lower than the 1977 levels across all roadway types. For controlled access roadways, 1992-94 levels averaged 4.1 dBA lower than 1977 levels; for non-controlled access roadways, 2.8 dBA lower.

Table 7. Heavy Trucks - 1977 vs. 1992-94 Data
Results of Non-parametric Statistical Analysis

	Number of Measurements		Different	**Population Shift (dBA)**
Roadway Type	1977	1992-94	Populations	95% Confidence Interval
1 CA, Level	590	171	YES	3.4≤ **3.7** ≤4.1
2 CA,Upgrade	704	137	YES	4.3≤ **4.8** ≤5.2
3 CA, Downgrade	618	139	YES	3.2≤ **3.8** ≤4.3
4 NCA, Level	312	125	YES	1.9≤ **2.5** ≤3.1
5 NCA, Upgrade	307	73	YES	3.1≤ **3.8** ≤4.5
6 NCA,Downgrade	380	80	YES	1.3≤ **2.1** ≤2.9

CA= Controlled Access NCA= Non-controlled Access

In Summary

From statistical testing of the actual data using the special method which normalized truck speeds, truck noise levels measured in 1992-94 were lower than those measured in 1977 for both Heavy Trucks and Medium Trucks & Buses. Averaged for all roadway types, Heavy Truck noise levels were 3.5 dBA lower than in 1977; Medium Truck & Bus noise levels, 2.3 dBA lower.

The findings of the REMEL comparison, though somewhat less accurate because of the assumption of normally distributed truck noise data, corroborated the findings of the statistical testing. The REMEL comparison indicated that 1992-94 truck noise levels for both Heavy Trucks and Medium Trucks & Buses were lower than in 1977 for essentially all speeds. At 50 mph, averaged for all roadway types, 1992-94 REMEL's were 3.5 dBA lower than 1977 REMEL's for Heavy Trucks, and 3.0 dBA lower for Medium Trucks & Buses.*

For both Heavy Trucks and Medium Trucks & Buses, between the years 1977 and 1992-94, noise levels for trucks traveling on controlled access highways fell about a decibel more than they did for trucks traveling on non-controlled access highways. This result was also supported by the REMEL comparison.

Truck noise levels may have decreased over the approximately 15 years between the two sets of measurements for some of the following reasons: 1) improved exhaust noise muffling systems, 2) quieter or better shielded engines, transmissions, and radiator cooling fans, and 3) quieter tire designs. The noise regulations for newly manufactured trucks that went into effect in January 1988 may have spurred some of these truck quieting improvements. Actually, it is surprising that greater reductions in truck noise were not made over this 15 year period; possibly cost or performance considerations have slowed the development of quieter trucks.

The reason that between 1977 and 1992-94, a greater decrease in noise was found for trucks operating on controlled access highways, might be that new trucks are being introduced more rapidly into this fleet than into the fleet of trucks that travel on non-controlled access highways.

* Over the twenty year period 1975-1995, FHWA found similar drops in REMELs for medium and heavy trucks (Reference 2, p.71).

Comparison of New Jersey's 1992-94 REMEL's and FHWA TNM REMEL's

This section compares the 1992-94 REMEL's measured in New Jersey to the REMEL's in the new FHWA Traffic Noise Model (TNM) which were measured in 1994-95.* For medium trucks, NJ REMEL's for Roadway Types 1 & 4 (level, controlled & non-controlled access) are compared to TNM's REMEL's for level roadways (*Figure 57, Reference 2, p. 375*) for baseline conditions (average pavement, level, and constant flow conditions), and NJ REMEL's for Roadway Types 2 & 5 (upgrade, controlled & non-controlled access) are compared to TNM's REMEL's for upgrade roadways (*Figure 57, Reference 2*).† For this comparison, REMEL's for NJ Truck Class 1 (Medium Trucks & Buses) were recalculated with buses removed. For heavy trucks, NJ REMEL's for Roadway Types 1 & 4 (level, controlled & non-controlled access) are compared to TNM's REMEL's for level roadways (*Figure 58*) for baseline conditions, and NJ REMEL's for Roadway Types 2 & 5 (upgrades, controlled & non-controlled access) are compared to TNM's REMEL's for upgrade roadways (*Figure 76*).

Level Roadways

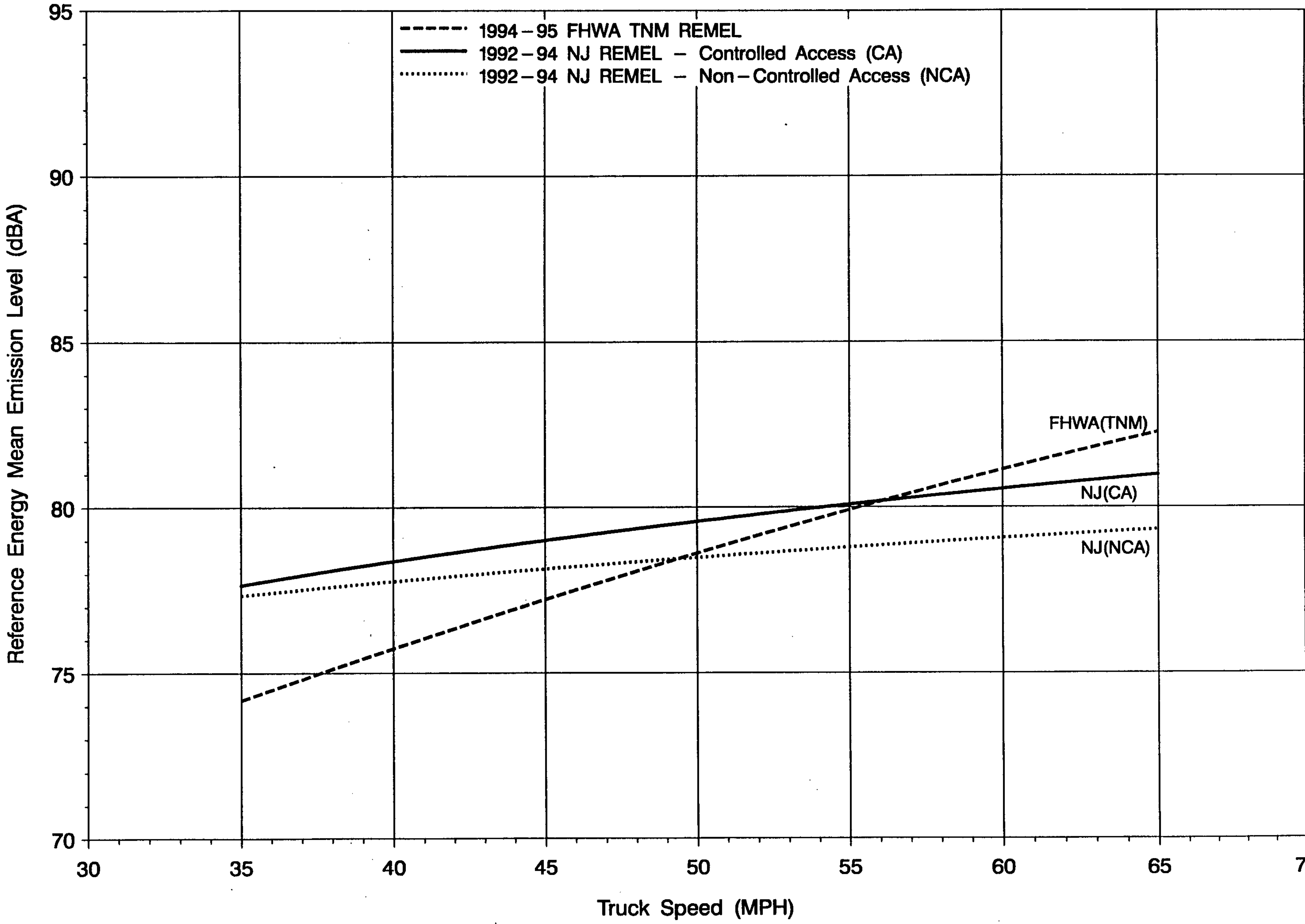
Medium Trucks

Figure 17, Page 58, provides a comparison of NJ and TNM REMEL's for speeds of 35-65 mph. An examination of the regression lines in this figure indicate that (1) TNM REMEL's have a much greater dependence on speed than do the NJ REMEL's, (2) below 49 mph, NJ REMEL's are higher, and (3) above 56 mph, TNM REMEL's are higher. Eighty percent of the medium

* For NJ REMEL's, it was assumed that truck noise levels were normally distributed. For TNM REMEL's, this assumption was not made. Also, NJ truck noise levels were measured with a microphone height of 4 feet above the ground; TNM truck noise levels, with a microphone height of 5 feet above the road surface.

† For medium trucks, TNM assumes REMEL's for upgrade roadways are the same as REMEL's for level roadways.

Figure 17: NJ REMELS VS. FHWA TNM REMELS – MEDIUM TRUCKS, LEVEL



truck speeds fell within the range 43-58 mph for the NJ data. Over this range, NJ REMEL's were within ± 2 dB of the TNM REMEL's. Data for the more common speeds of 50 and 55 mph -- speeds that are more likely to be used for noise prediction -- are shown in the table below.

Table 8. Comparison of NJ & TNM REMEL's for Medium Trucks, Level Roadways (dBA)

Speed (Mph)	FHWA (TNM)	NJ(CA)	NJ(NCA)
50	78.6	79.5 (+0.9)	78.4 (-0.2)
55	79.9	80.1 (+0.2)	78.7 (-1.2)

Plus sign indicates NJ REMEL's are higher than TNM REMEL's.

Table 8 shows the differences between the NJ and TNM REMEL's in parentheses. As you can see, these differences are on the order of 1 dBA or less. With regard to noise predictions done using 50 mph for medium trucks on non-controlled access highways and 55 mph for medium trucks on controlled access highways, we find that there is essentially no difference (+0.2 & -0.2 dBA) between the NJ and TNM medium truck REMEL's for these speeds.

Heavy Trucks

Figure 18 on Page 60 compares NJ and TNM REMEL's for speeds of 35-70 mph. This figure indicates that (1) TNM REMEL's have a much greater dependence on speed than do the 1992-94 NJ REMEL's, (2) below 47 mph, NJ REMEL's are higher, and (3) above 52 mph, TNM REMEL's are higher. For the NJ data 80% of the speeds were in the range 41-57 mph. Over this range, NJ REMEL's were within ± 2.3 dB of the TNM REMEL's. Data for the more common speeds of 50 and 55 mph -- speeds that are more likely to be used for noise prediction -- are shown in Table 9 on Page 61.

Figure 18: NJ REMELS VS. FHWA TNM REMELS – HEAVY TRUCKS, LEVEL

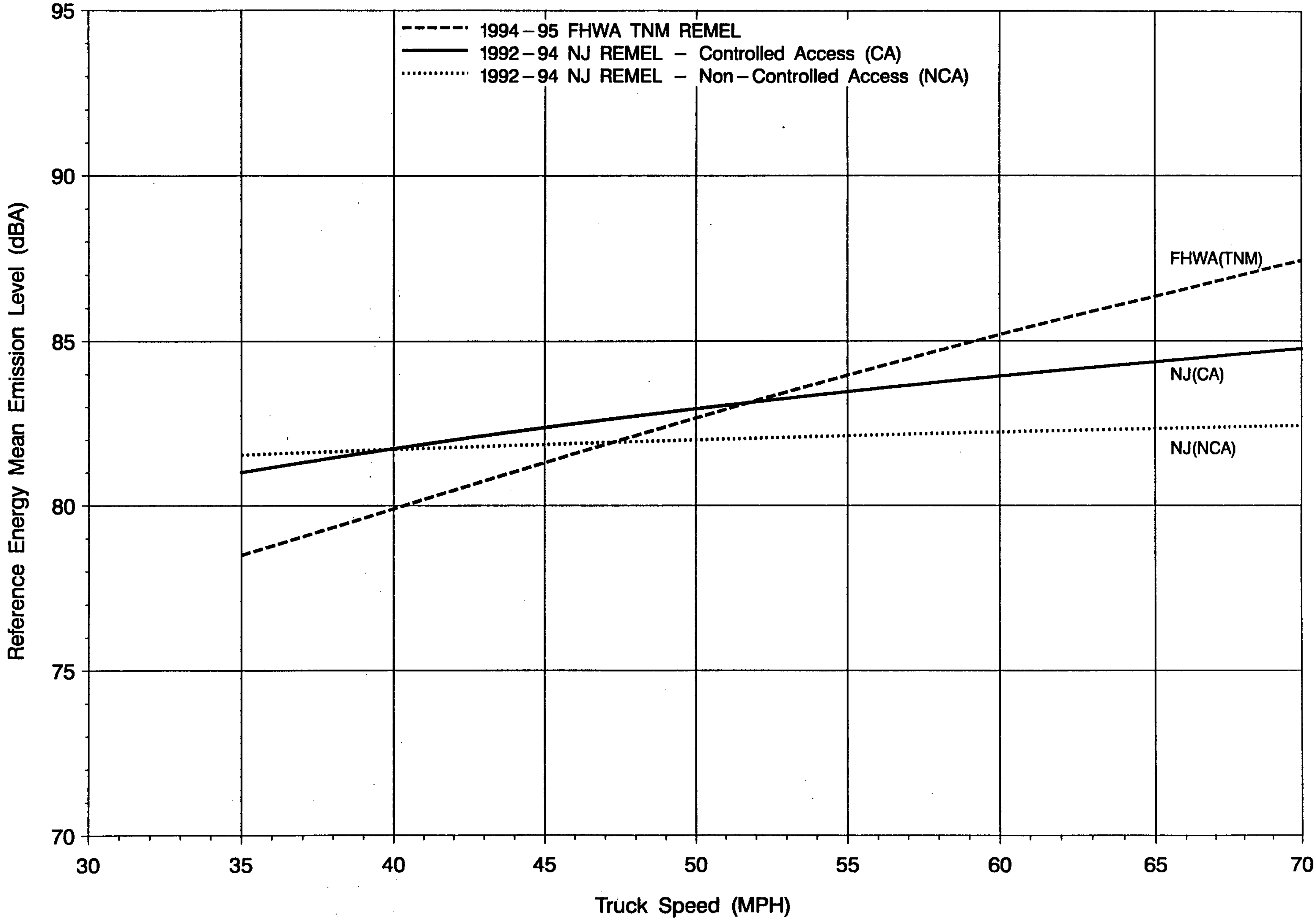


Table 9. Comparison of NJ & TNM REMEL's for Heavy Trucks, Level Roadways (dBA)

Speed (Mph)	FHWA (TNM)	NJ(CA)	NJ(NCA)
50	82.7	82.9 (+0.2)	82.0 (-0.7)
55	84.0	83.5 (-0.5)	82.1 (-1.9)

Negative sign indicates NJ REMEL's are lower than TNM REMEL's.

Table 9 shows the differences between the NJ and TNM REMEL's in parentheses. Notice that these differences are generally less than 1 dBA. With regard to noise predictions done using 50 mph for heavy trucks on non-controlled access highways and 55 mph for heavy trucks on controlled access highways, we find that there is a difference of approximately 1/2 dB (-0.5 & -0.7) between the NJ and TNM heavy truck REMEL's for these speeds.

Upgrade Roadways

Medium Trucks

Figure 19 on Page 62 compares NJ and TNM REMEL's for speeds of 35-65 mph. TNM assumes that there is no grade adjustment for medium trucks: so the TNM level roadway REMEL's for medium trucks are used for this comparison. Figure 19 indicates that TNM REMEL's have a greater speed dependence than NJ REMEL's, and that NJ REMEL's are higher than TNM REMEL's for the majority of speeds (all speeds below 56 mph). For the NJ data, 80 % of the speeds were in the range 41.5 to 56.5 mph. Over this range, NJ REMEL's were higher by an amount which decreased with increasing speed; i.e., 3.3 dBA higher at 41.5 mph, essentially equal at 56.5 mph. Data for the more common speeds of 45 and 50 mph -- speeds that are more likely to be used for noise predictions on upgrade roadways -- are shown in Table 10 on Page 63.

Figure 19: NJ REMELS VS. FHWA TNM REMELS — MEDIUM TRUCKS, UPGRADES

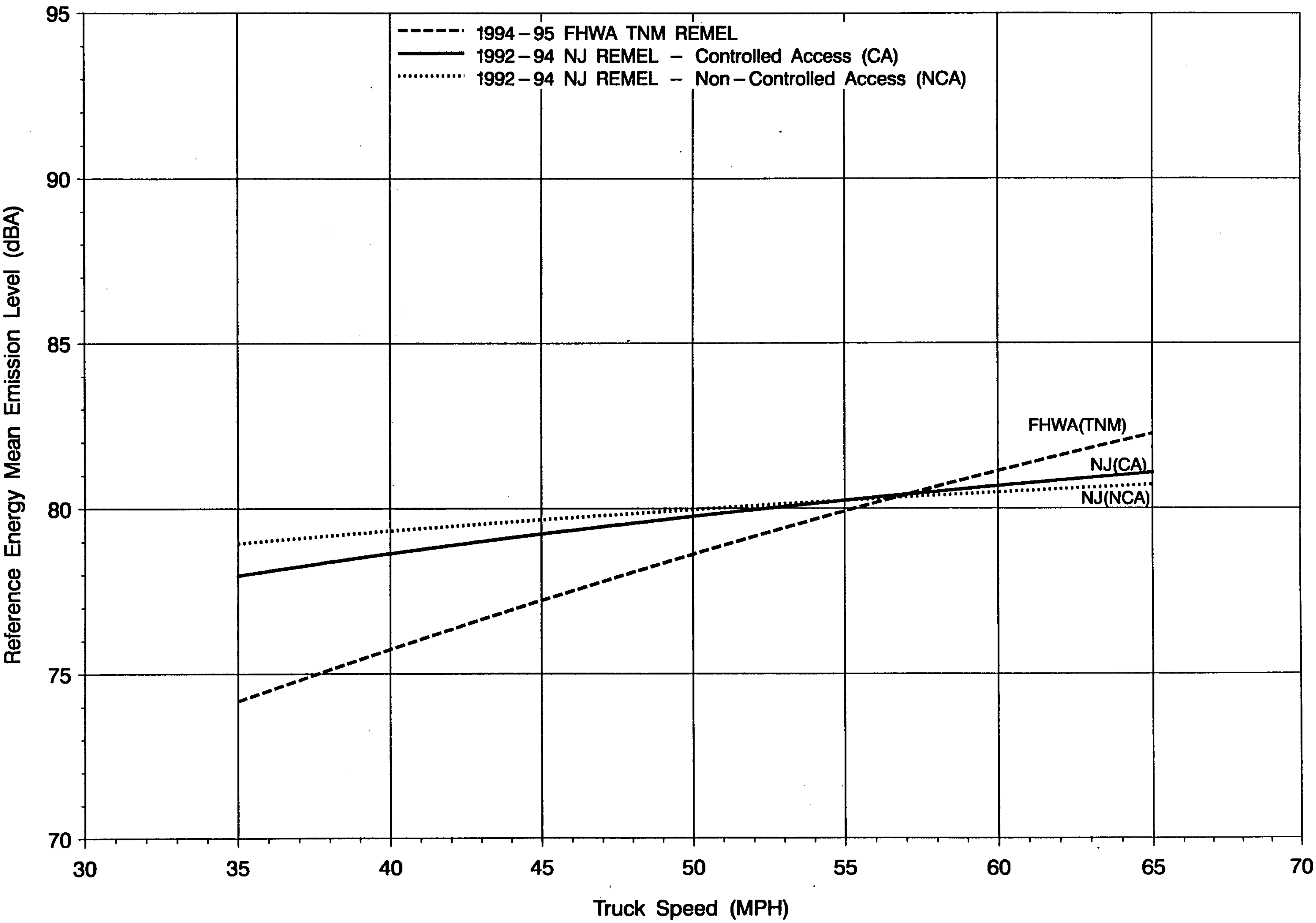


Table 10. Comparison of NJ & TNM REMEL's for Medium Trucks, Upgrade Roadways(dBA)

Speed (Mph)	FHWA (TNM)	NJ(CA)	NJ(NCA)
45	77.3	79.2 (+1.9)	79.7 (+2.4)
50	78.7	79.8 (+1.1)	80.0 (+1.3)

Plus sign indicates NJ REMEL's are higher than TNM REMEL's.

The differences between NJ and TNM REMEL's are shown in parentheses. Table 10 indicates that NJ REMEL's are about 1.0 to 2.5 dBA higher. With regard to noise predictions done using 45 mph for medium trucks on non-controlled access highways and 50 mph for medium trucks on controlled access highways, we find that the NJ medium truck REMEL's are 1.1 and 2.4 dBA higher than the TNM medium truck REMEL's for upgrade roadways at these speeds.

Heavy Trucks

Figure 20 on Page 64 compares NJ and TNM REMEL's for speeds of 30-65 mph. This figure indicates that (1) TNM REMEL's have a slightly greater dependence on speed than do the 1992-94 NJ REMEL's, (2) for control access highways, NJ REMEL's are lower than the TNM REMEL's for all speeds, and (3) for non-controlled access highways, NJ REMEL's are virtually the same as TNM REMEL's below 40 mph; and lower than TNM REMEL's, above 40 mph. For the NJ data 80% of the speeds were in the range 37-55 mph. Over this range, NJ REMEL's were within + 0.2 to -2.4 dB of the TNM REMEL's. Data for the more common speeds of 45 and 50 mph -- speeds that are more likely to be used for noise prediction on upgrade roadways -- are shown in Table 11 on Page 65.

Figure 20: NJ REMELS VS. FHWA TNM REMELS – HEAVY TRUCKS, UPGRADES

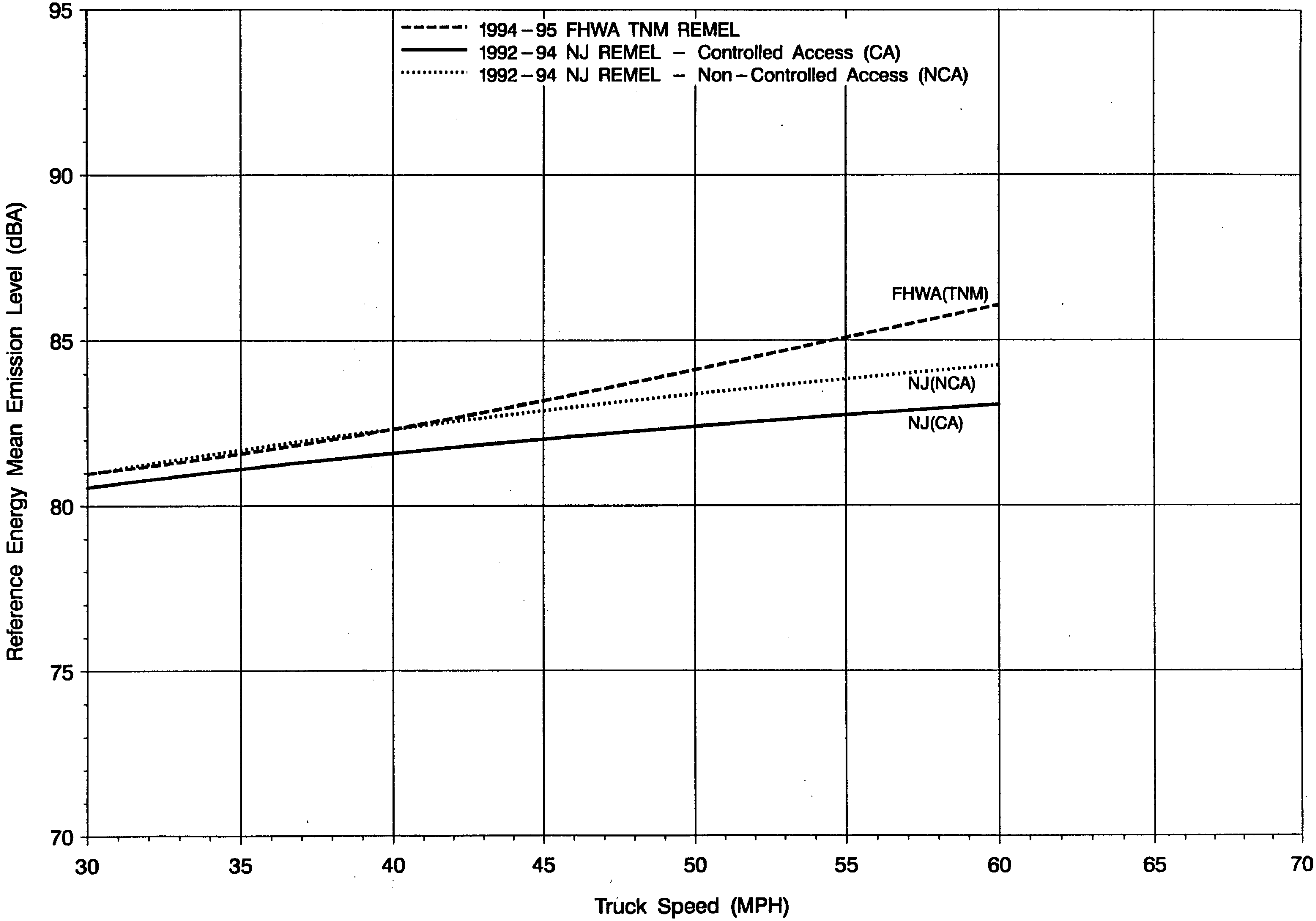


Table 11. Comparison of NJ & TNM REMEL's for Heavy Trucks, Upgrade Roadways (dBA)

Speed (Mph)	FHWA (TNM)	NJ(CA)	NJ(NCA)
45	83.2	82.0 (-1.2)	82.9 (-0.3)
50	84.1	82.4 (-1.7)	83.4 (-0.7)

Negative sign indicates NJ REMEL's are lower than TNM REMEL's.

Table 11 shows the differences between the NJ and TNM REMEL's in parentheses. Notice that these differences are on the order of 1.5 dBA or less. With regard to noise predictions done using 45 mph for heavy trucks on non-controlled access highways and 50 mph for heavy trucks on controlled access highways, we find, at these speeds there is essentially no difference (-0.3 dBA) between NJ and TNM heavy truck upgrade REMEL's for non-controlled access highways; however, there is a meaningful difference (-1.7 dBA) between the NJ and TNM heavy truck upgrade REMEL's for controlled access highways.

Summary

Level Roadways

TNM REMEL's have a greater speed dependence than the NJ REMEL's (See Figures 17 & 18, Pages 58 & 60). The difference between NJ & TNM REMEL's is less than ±2.0 dBA for medium trucks and less than ±2.3 dBA for heavy trucks over the central speed range encompassing 80% of the data. For speeds likely to be used for noise predictions, there is essentially **no difference** (< 3/4 dB) between the NJ and TNM truck REMEL's for level roadways (see Table 12 on the next page).

Table 12. Differences In NJ and TNM REMEL's for Speeds Used for Noise Predictions (dBA)

	Controlled Access		Non-Controlled Access	
	50 mph	55 mph	45 mph	50 mph
Medium, Level	--	+0.2	--	-0.2
Heavy, Level	--	-0.5	--	-0.7
Medium, Upgrades	+1.1	--	+2.4	--
Heavy, Upgrades	-1.7	--	-0.3	--

Notes: Plus sign indicates NJ REMEL's are higher than TNM REMEL's. Negative sign indicates that NJ REMEL's are lower than TNM REMEL's.

Upgrade Roadways

TNM REMEL's have a greater speed dependence than the NJ REMEL's, but the difference in speed dependence is not as marked for heavy trucks (See Figures 19 & 20, Pages 62 & 64). The difference between NJ REMEL's and TNM REMEL's is 0 to +3.3 dBA for medium trucks and +0.2 to -2.4 dBA for heavy trucks over the central speed range encompassing 80% of the data. For speeds likely to be used for noise predictions, there are **some meaningful differences** between the NJ and TNM REMEL's for upgrade roadways -- -1.7 dBA for heavy trucks on controlled access upgrades and +2.4 dBA for medium trucks on non-controlled access upgrades (see Table 12 above).

However, noise levels **predicted** for upgrades roadways by the two sets of REMEL's do not exhibit these same meaningful differences. This occurs because the differences between NJ and TNM REMEL's tend to be in the opposite direction for medium and heavy trucks (see Table 12), and because of the dominance of heavy truck noise and the large number of cars in a traffic stream. To illustrate this, noise levels were predicted for a controlled access upgrade and a non-controlled access upgrade using both the NJ and TNM REMEL's.* For a controlled access upgrade with high truck volumes (5% medium trucks, 25% heavy trucks, 70% cars), and truck speeds of 50 mph and car speeds of 55 mph, the NJ REMEL's predicted noise levels **1.2 dBA** lower than the TNM REMEL's. For a non-controlled access upgrade with high truck volumes (10% medium trucks, 20% heavy trucks, 70% cars), and truck speeds of 45 mph and car speeds of 55 mph, the NJ REMEL's predicted noise levels **0.1 dBA** higher than the TNM REMEL's. In practical terms, noise levels predicted for upgrade roadways using either the NJ or TNM truck REMEL's **will not be significantly different**.

* No barrier case.

IMPLEMENTATION

The implementable products of this study are new vehicle noise emission levels (REMEL's) for medium and heavy trucks traveling on various types of New Jersey highways. These truck noise emission levels are the main noise source input of the FHWA computer program used by NJDOT to predict expected noise levels adjacent to a highway and design noise barriers. The new truck REMEL's were measured in 1992-94, and when implemented, they will replace truck REMEL's measured more than 15 years earlier. Accordingly, a significant improvement in the accuracy of predicted highway noise levels will be achieved.

Since the use of these new truck noise emission levels would be a modification of existing FHWA approved noise prediction methods as outlined in Reference 4, the updated NJ REMEL's are subject to approval by FHWA. Once this approval is obtained, they can be utilized in the FHWA highway traffic noise prediction computer program. The fastest way to implement the new REMEL's is to utilize the user defined vehicle input of the program. That is, for the type of roadway under consideration, new medium and heavy trucks would be defined having the updated NJ REMEL's, and the standard medium and heavy trucks in the program, with their outdated emission levels, would not be used.

This report, which describes how truck noise was measured and analyzed for this study and presents the information required for implementation, will be given to the NJDOT study sponsor, the Bureau of Environmental Analysis (BEA), which is responsible for noise predictions and noise barrier designs. As required, meetings will be held between Research Unit personnel and BEA staff to review and clarify the findings of this study, thus aiding in their implementation.

Benefits

As already mentioned, use of the updated NJ truck noise emission levels will improve the accuracy of any future noise predictions done at NJDOT. However, since the new truck noise levels are significantly lower, there is the following additional benefit.

The lower truck noise levels will, in most cases, result in lower predicted community noise levels adjacent to proposed highways, and consequently, fewer and less severe noise impacts will be identified. This will in turn lead NJDOT to design and construct fewer and/or smaller noise barriers to mitigate the expected noise impacts, and there will be a corresponding savings in both the time and money. To put a dollar amount on this savings is difficult, but an estimate is given below.

Since an average noise barrier costs NJDOT roughly $2.5 million per mile to construct, a reduction in noise barrier length of only 100 feet yields a cost savings of approximately $47,350. On a program level, NJDOT spends on average about $15 million a year to construct noise barriers. It is estimated that using the lower truck noise levels developed for this study for noise prediction and barrier design, would reduce noise barrier construction by 10-15%, which for an average year represents a cost savings of $1.5-2.3 million.

REFERENCES

1. Sasor, S.R., Determination of Truck Noise Levels for New Jersey, Report No. 81-006-7791, N.J. Department of Transportation, Final Report, July 1980.

2. Fleming, Greg G., Rapoza, Amanda S., & Lee, Cynthia S.Y., Development of National Reference Energy Mean Emission Levels for the FHWA Traffic Noise Model (FHWA TNM), Version 1.0, Report No. DOT-VNTSC-FHWA-96-2, Final Report, November 1995, USDOT, Volpe National Transportation Systems Center.

3. Menge, C.W., (Bowlby, W., Higgins, J., Reagan, J.,editors), Noise Barrier Cost Reduction Procedure STAMINA 2.0/OPTIMA: User's Manual, Report No. FHWA-DP-58-1, Enhanced Version, Federal Highway Administration, Demonstration Projects Program, April 1982.

4. "Procedures for Abatement of Highway Traffic Noise and Construction Noise", Federal Aid Highway Program Manual, Volume 7, Chapter 7, Section 3, Federal Highway Administration, U.S. Department of Transportation.

5. Kessler, F.M. & Alexander, M., Sound Procedures for Measuring Highway Noise, Report No. FHWA-DP-45-1, Interim Report, May 1978, Federal Highway Administration, Region 15.

6. Hollander, M. & Wolfe, D.A., Nonparametric Statistical Methods, Chapter 4, Pages 67-82, John Wiley & Sons, Inc., New York, 1973.

APPENDIX A

Data Collection, Measurement Sites, Equipment

This appendix contains the following information:

(1) a typical measurement site setup,

(2) a list of data collection and data reduction equipment (including software),

(3) tables listing the 25 measurement sites broken down by roadway type, and

(4) a table listing the number of truck noise measurements by axle classification.

The site numbers in Tables A-1 through A-6 are the site numbers from the 1977 NJ truck noise study (see Reference 1).

The truck axle classifications in Table A-7 are illustrated in Figure 1, Page 14 and the code is as follows:

[2,6] Two axle, dual tire rear wheels, single unit body

[2T] Tractor without semitrailer, two axle, dual tire rear wheels

[3T] Three axle tractor without semitrailer

[2B] Two axle bus, dual tire rear wheels

[3B] Three axle bus

[3] Three axle, single unit body

[4] Four axle, single unit body

[2-1] Two axle tractor, one axle semitrailer

[2-2] Two axle tractor, two axle semitrailer

[2-3] Two axle tractor, three axle semitrailer

[3-1] Three axle tractor, one axle semitrailer

[3-2] Three axle tractor, two axle semitrailer

[3-3] Three axle tractor, three axle semitrailer

Figure A-1. TYPICAL MEASUREMENT SITE SETUP

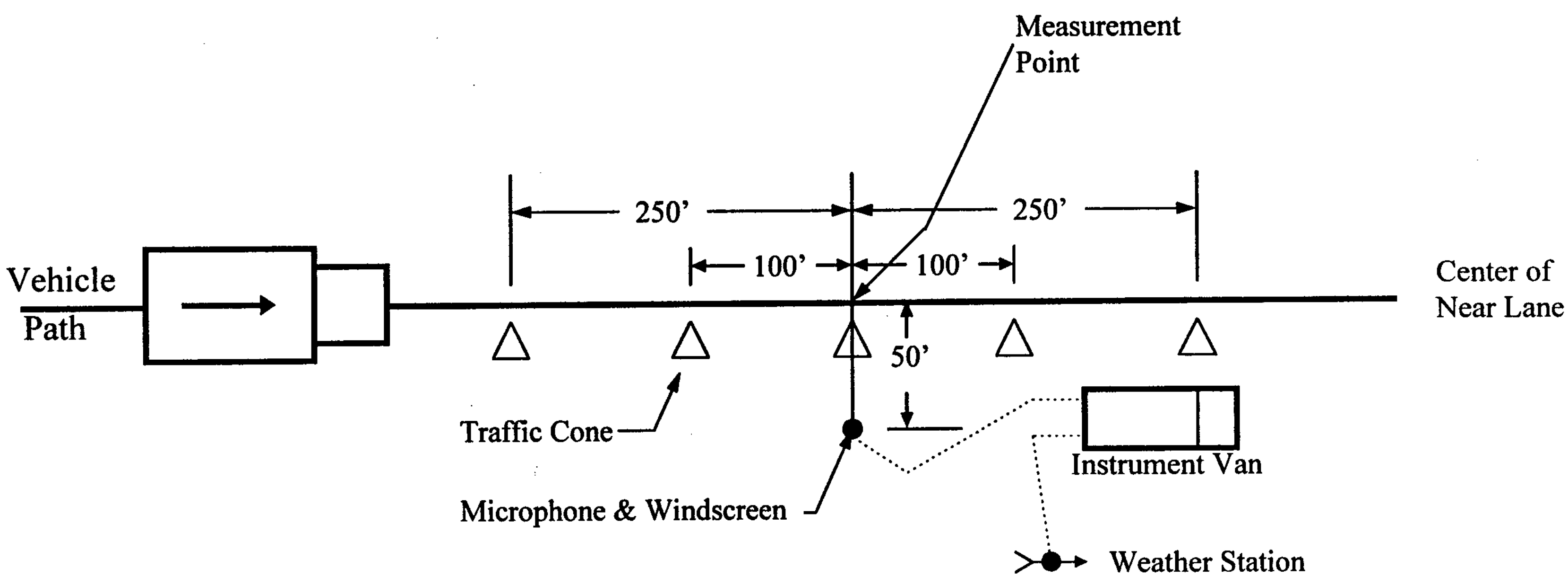


Figure A-2. DATA COLLECTION AND REDUCTION EQUIPMENT

Data Collection

1) Larson-Davis Laboratories Model 3200 1/3 Octave Real-Time Analyzer w/floppy disk drive
2) Larson-Davis Model 2559 1/2 inch condenser microphones (precision random incidence response) with B&K Windscreens
3) Nagra IV-SJ Reel to Reel Tape Recorder (Two Channel + Cue Channel)
4) Larson-Davis Model 900B Precision Microphone Preamplifiers
5) Larson-Davis 200' Microphone Cables Model EC-200
6) Acme Lite Heviwate Tripods
7) B&K 4220 124 dB Pistonphone Calibrator
8) B&K UZ-0001 Barometer
8) Davis Instruments Weather Monitor II (Temperature, Relative Humidity, Wind Speed & Direction, Barometric Pressure)
9) Koss PRO/4X Plus Headphones
10) Nagra Cue Microphone (used for voice descriptions)
11) 12 Volt Automotive Battery (power source for Nagra)
12) nu-metrics Roadstar 40 DMI (distance measuring instrument)

Data Reduction (including software)

Hardware
1) Larson-Davis Model 3200 1/3 Octave Real-Time Analyzer w/floppy disk drive
2) Nagra IV-SJ Reel to Reel Tape Recorder (Two Channel + Cue Channel)
3) B&K Model 2305 Graphic Level Recorder
4) Misco Speaker
5) Koss PRO/4X Plus Headphones

Software
6) Index Data Systems Ltd. - nVision Acoustic Data Visualization System Version 3.20
7) SAS Institute - The SAS System for Windows Release 6.12
8) QBASIC 4.5 Programming Language
9) Mansfield Software Group - KEDIT for Windows Version 1.0

Table A-1. Measurement Sites For Roadway Type 1 (Controlled Access Highways, ≤ 2% Grade)

Site #	Location (Route & Milepost)	General Location	Description	Grade Steepness	Grade Length	Dates
1	I-78 West MP 4 + 4,163'	5 miles east of Phillipsburg	4 lane rural freeway	+ 0.4 %	--	10/7/92 10/13/92
2*	I-95 North MP 70 + 1680'	5 miles north of Trenton	6 lane urban freeway	-0.5 %	--	9/(14 & 16)/92 8/24/94
3	I-287 North MP 17 + 1937'	2 miles north of Somerville	6 lane urban freeway	+0.2 %	--	10/21/92
4	I-295 South MP 16 + 2716'	10 miles southwest of Camden	4 lane rural freeway	-0.5 %	--	8/8/94
5	Route 55 South MP 22 - 300'	5 miles south of Vineland	4 lane rural freeway	-0.3 %	--	8/9/94

* Replacement site

Table A-2. Measurement Sites For Roadway Type 2 (Controlled Access Highways, > 2% Upgrade)

Site #	Location (Route & Milepost)	General Location	Description	Grade Steepness	Grade Length	Dates
6	I-78 West MP 10 + 3591'	10 miles east of Phillipsburg	6 lane rural freeway	+4.0 %	1.4 mi.	10/22/92 11/23/93
7	I-80 West MP 9 + 1487'	10 miles northwest of Hackettstown	6 lane rural freeway	+2.9 %	0.2 mi.	8/1/94
8	I-78 West MP 28 + 3489'	5 miles north of Somerville	6 lane rural freeway	+3.0 %	0.25 mi	12/8/92 7/21/94
11	I-295 North MP 53 + 400'	10 miles south of Trenton	6 lane rural freeway	+2.6 %	0.22 mi	9/17/92

Table A-3. Measurement Sites For Roadway Type 3 (Controlled Access Highways, > 2% Downgrade)

Site #	Location (Route & Milepost)	General Location	Description	Grade Steepness	Grade Length	Dates
12	I-78 East MP 21 - 3637'	2 miles east of Clinton	6 lane rural freeway	-3.0 %	0.7 mi.	12/3/93
13	I-287 North MP 28 + 5067'	5 miles south of Morristown	4 lane rural freeway	-2.9 %	0.4 mi.	12/7/93
14	I-295 North MP 53.55	10 miles south of Trenton	6 lane rural freeway	-2.7 %	0.25 mi	6/24/93
15	I-280 West MP 5.35	5 miles northwest of Orange	6 lane urban freeway	-3.9 %	0.5 mi.	8/11/94
16*	I-80 East MP 9 + 2725'	10 miles northwest of Hackettstown	6 lane rural freeway	-2.7 %	0.35 mi	8/3/94

* Replacement site

Table A-4. Measurement Sites For Roadway Type 4 (Non-Controlled Access Highways, ≤ 2% Grade)

Site #	Location (Route & Milepost)	General Location	Description	Grade		Dates
				Steepness	Length	
17	Route 33 West MP 19 + 1741'	10 miles east of Hightstown	4 lane rural divided highway	-0.6 %	--	12/18/92 12/21/92
19*	Route 202 North MP 7 - 2171'	5 miles south of Flemington	4 lane rural divided highway	+1.0 %	--	11/18/93
20	Route 130 North MP 74 + 1134'	10 miles south of New Brunswick	4 lane rural divided highway	-0.3 %	--	9/24/92 9/30/92
21*	Route 206 North MP 19 + 438'	5 miles south of Mount Holly	2 lane rural undivided highway	+0.4 %	--	12/8/93

* Replacement site

Table A-5. Measurement Sites For Roadway Type 5 (Non-Controlled Access Highways, > 2% Upgrade)

Site #	Location (Route & Milepost)	General Location	Description	Grade		Dates
				Steepness	Length	
22	Route 206 North MP 61 - 2118'	10 miles north of Princeton	2 lane rural undivided	+2.6 %	0.3 mi.	10/1/92
24	Route 31 North MP 34 + 1774'	2 miles north of Clinton	2 lane rural undivided	+4.3 %	0.15 mi	12/14/93
25*	Route 22 East MP 23 + 1560'	5 miles east of Clinton	4 lane rural divided highway	+3.5 %	0.15 mi	12/13/93

* Replacement site

Table A-6. Measurement Sites For Roadway Type 6 (Non-Controlled Access Highways, > 2% Downgrade)

Site #	Location (Route & Milepost)	General Location	Description	Grade		Dates
				Steepness	Length	
26	Route 206 South MP 84 + 2205'	5 miles south of Chester	3 lane rural undivided highway	-5.0 %	0.55 mi	12/20/93
28	Route 46 West MP 23 - 531'	2 miles east of Hackettstown	4 lane rural divided highway	-6.1 %	1.7 mi.	12/6/93
29	Route 31 North MP 31 + 2635'	1 mile south of Clinton	4 lane rural divided highway	-5.0 %	0.1 mi.	11/30/93
30	Route 31 South MP 34 + 1504'	2 miles north of Clinton	2 lane rural undivided highway	-4.3 %	0.25 mi	12/2/93

Table A-7. Number Of Truck Noise Measurements By Axle Classification And Percentage Of Total

Truck Classification	ROADWAY TYPE								
	1	2	3	4	5	6	Total 1,2,&3	Total 4,5,& 6	Total All
1 - [2,6]	46(21.0)*	30 (17.8)	27 (16.1)	46 (26.1)	40 (34.8)	35 (29.4)	103(18.5)	121(29.5)	224(23.2)
2 - [2T]	0	0	0	0	0	1	0	1	1
3 - [3T]	2	3	2	3	0	0	7	3	10
4 - [2B]	2	1	2	4	2	3	5	9	14
5 - [3B]	0	1	0	1	0	0	1	1	2
6 - [3]	26 (11.9)	11 (6.5)	13 (7.7)	21 (11.9)	23 (20.0)	15 (12.6)	50 (9.0)	59 (14.4)	109(11.3)
7 - [4]	6	1	2	4	1	6 (5.0)	9	11	20
8 - [2-1]	2	0	2	2	1	2	4	5	9
9 - [2-2]	4	11 (6.5)	8	14 (8.0)	4	8 (6.7)	23	26 (6.3)	49 (5.1)
10 - [2-3]	0	0	1	1	0	0	1	1	2
11 - [3-1]	1	0	2	1	0	1	3	2	5
12 - [3-2]	128(58.4)	111(65.7)	109(64.9)	77 (43.8)	42 (36.5)	46 (38.7)	348(62.6)	165(40.2)	513(53.1)
13 - [3-3]	2	0	0	2	2	2	2	6	8
Total	219	169	168	176	115	119	556	410	966

* Percentages in parentheses. See Page 5 for definition of truck classifications. [2,6] = Two axles, six tires
[2T] = Two axle tractors [2B] = Two axle buses [3] = Three axle, single unit body [3-2] = Three axle tractor, two axle semitrailer
(Note: Measurements taken for 8 two axle tractors with double trailers not listed)

APPENDIX B

Regressions of Truck Noise Emission Level vs. Speed

This appendix contains twelve plots of truck noise emission level, L_{MaxA}, in dBA versus speed in miles per hour. Note that these figures **do not** show truck REMEL's -- REMEL's are shown on Pages 41-53. As indicated on the plots, these figures compare the regressions for the 1977 NJ truck noise data to those for the 1992-94 NJ truck noise data. Actual data values are also plotted for 1992-94 trucks. Figures B-1 to B-6 are plots for Truck Class 1 (Medium Trucks & Buses) for each of the six roadway types (see Page 15, for more detail):

(1) controlled access, level roadways
(2) controlled access, upgrade roadways
(3) controlled access, downgrade roadways
(4) non-controlled access, level roadways
(5) non-controlled access, upgrade roadways
(6) non-controlled access, downgrade roadways.

Figures B-7 to B-12 are plots of Truck Class 2 (Heavy Trucks) for each of the six roadway types.

Figure B-1: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 1 (Controlled Access, Level) – MEDIUM TRUCKS & BUSES

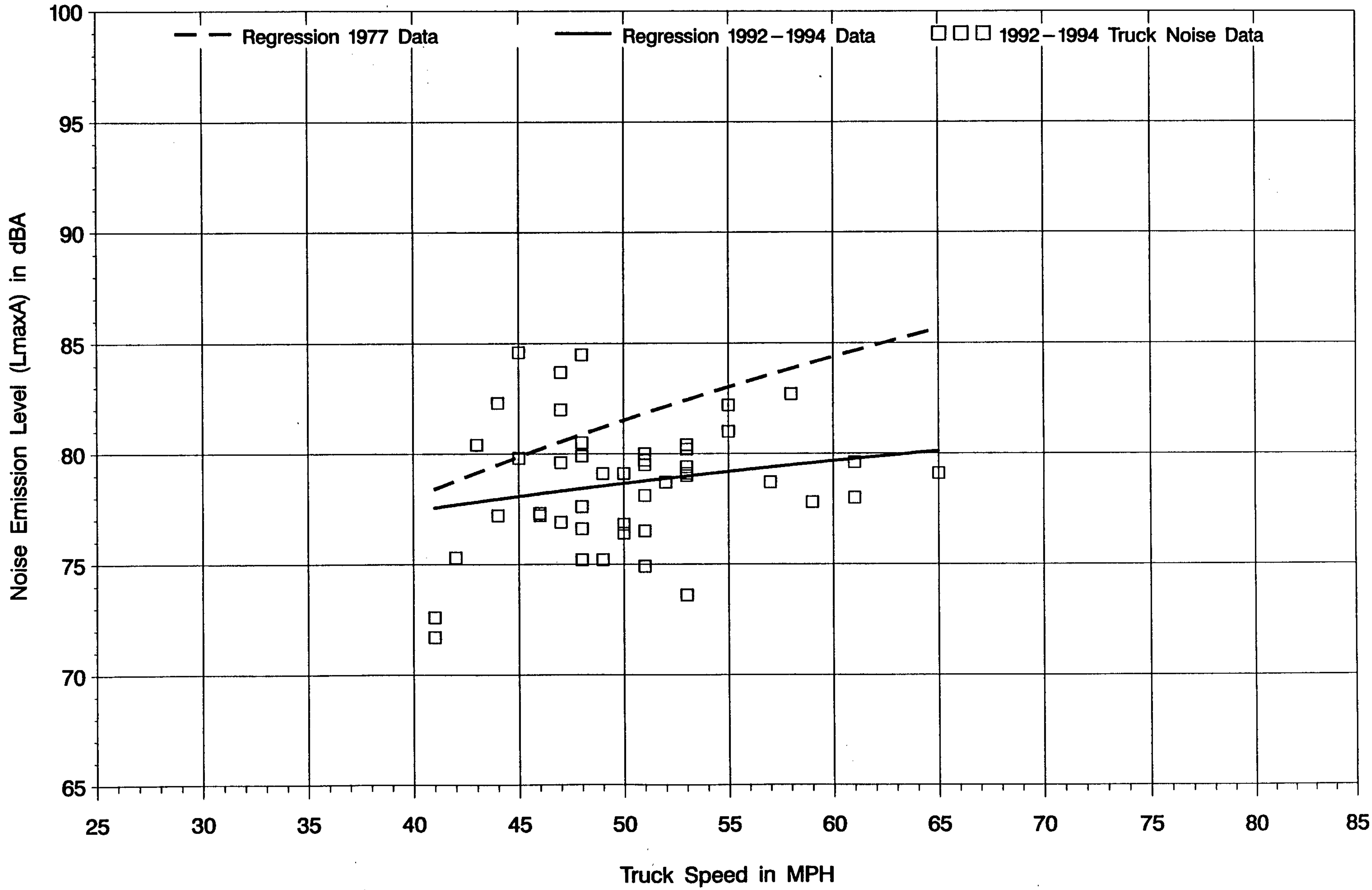


Figure B-2: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 2 (Controlled Access, Upgrade) – MEDIUM TRUCKS & BUSES

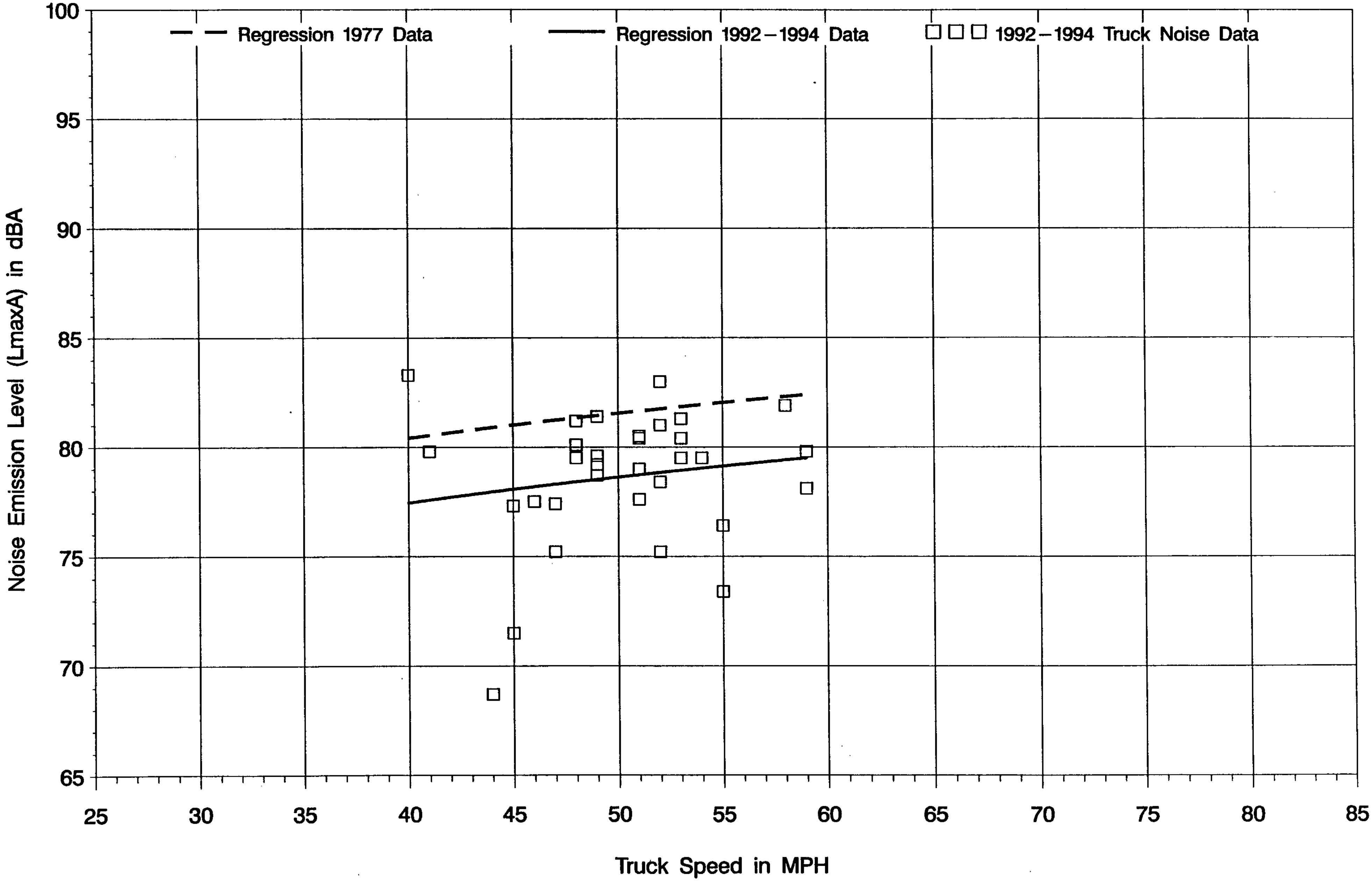


Figure B–3: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 3 (Controlled Access, Downgrade) – MEDIUM TRUCKS & BUSES

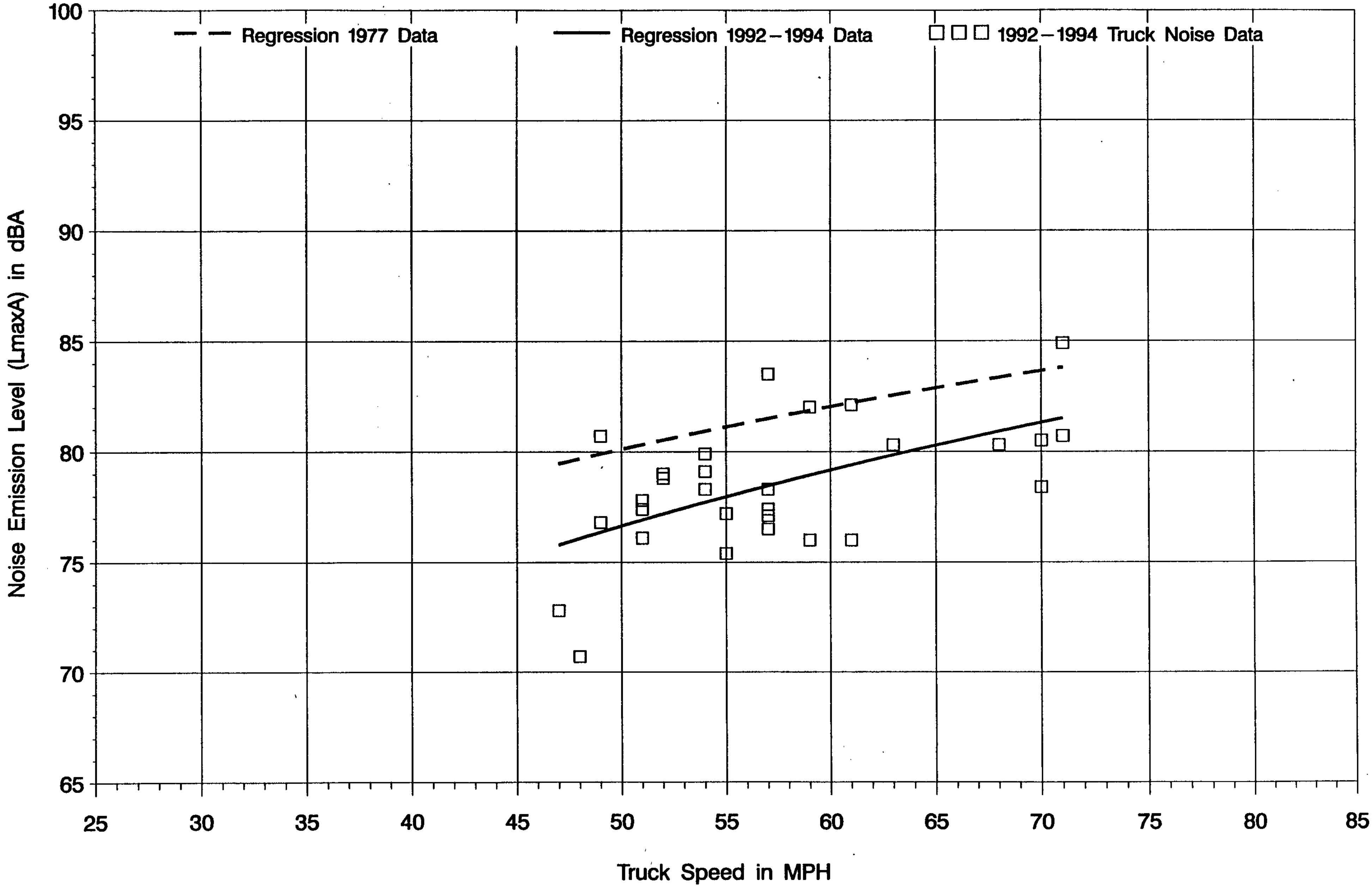


Figure B-4: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 4 (Non-Controlled Access, Level) - MEDIUM TRUCKS & BUSES

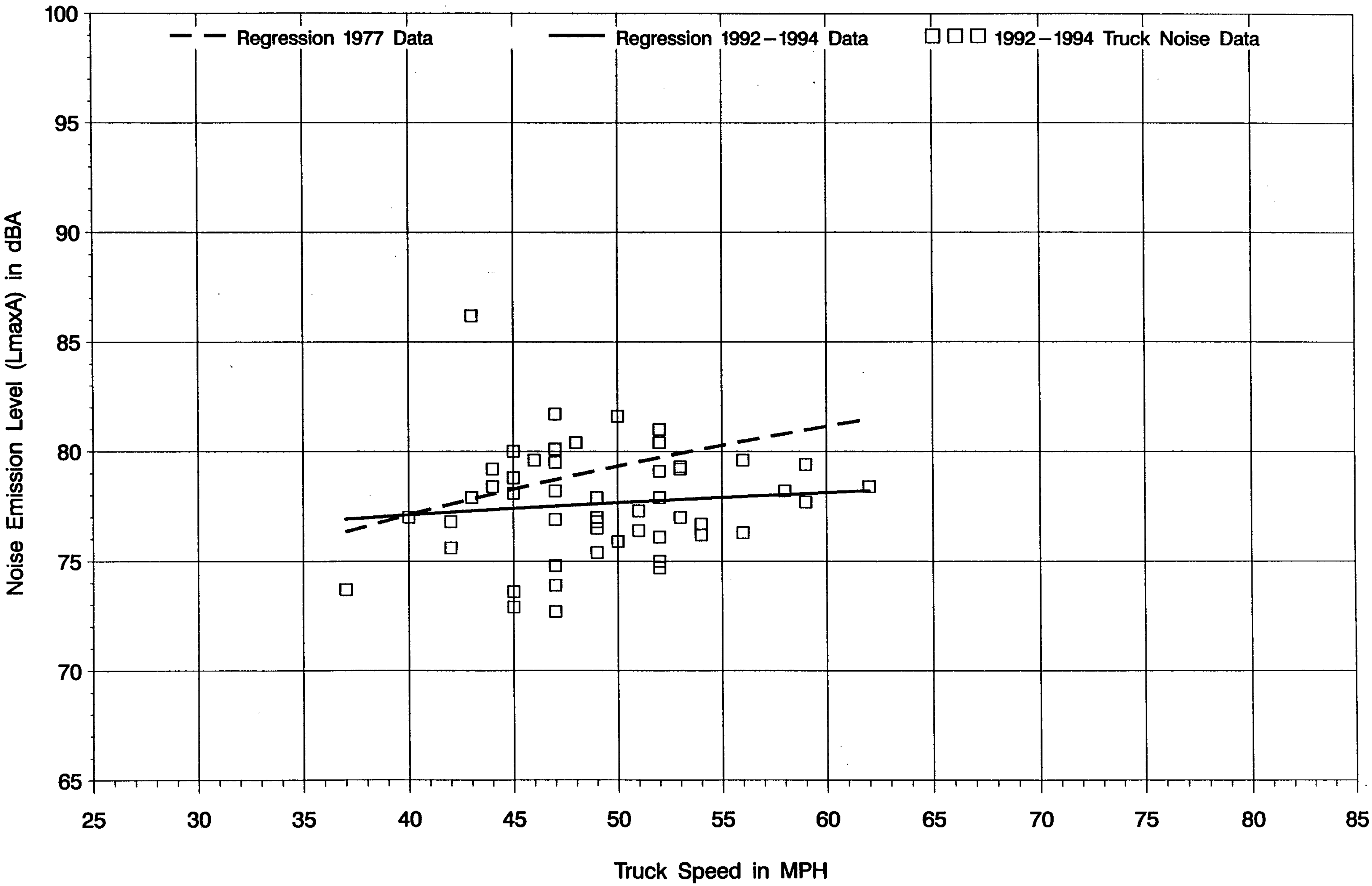


Figure B-5: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 5 (Non-Controlled Access, Upgrade) - MEDIUM TRUCKS & BUSES

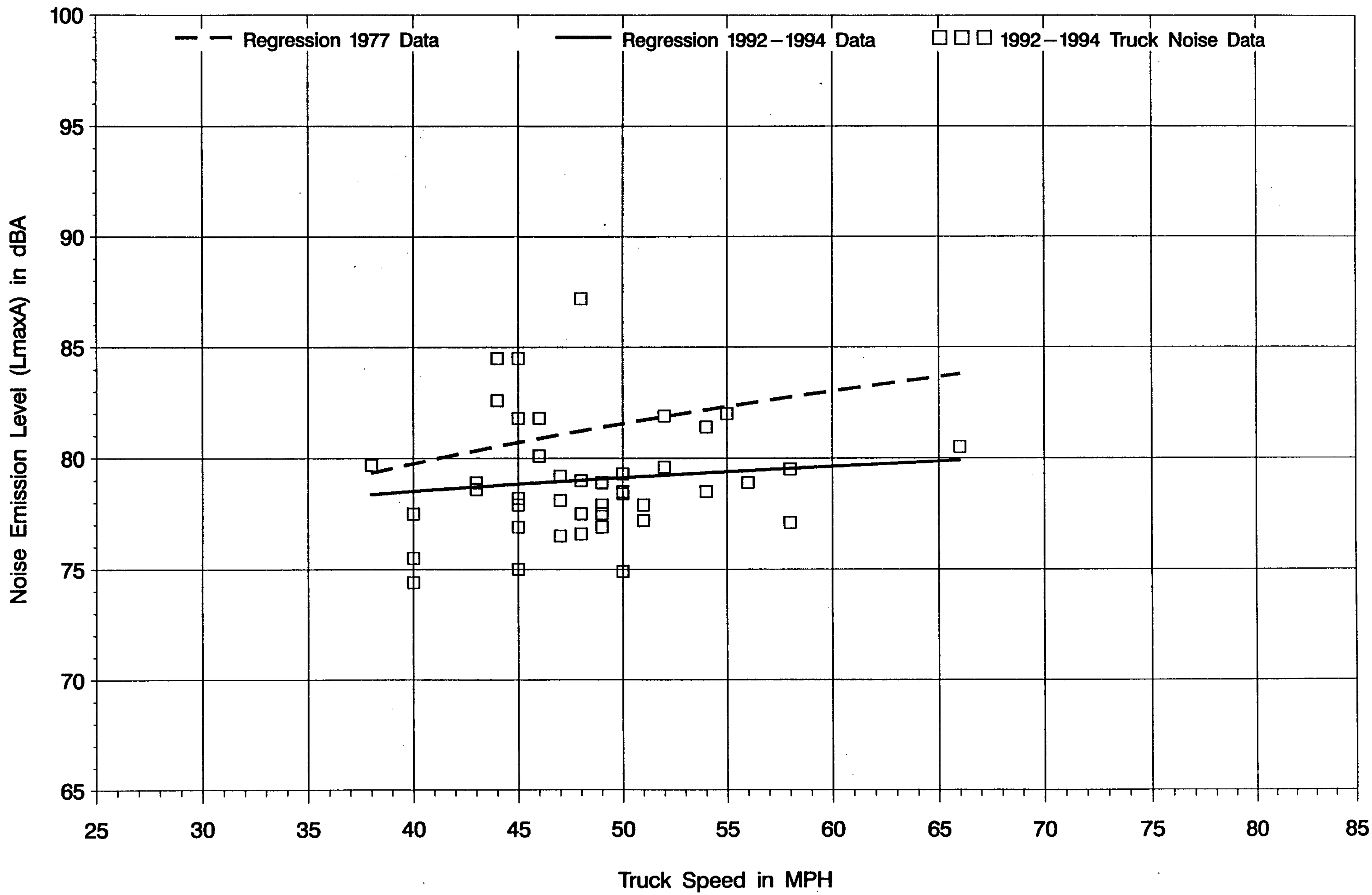


Figure B-6: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 6 (Non-Controlled Access, Downgrade) - MEDIUM TRUCKS & BUSES

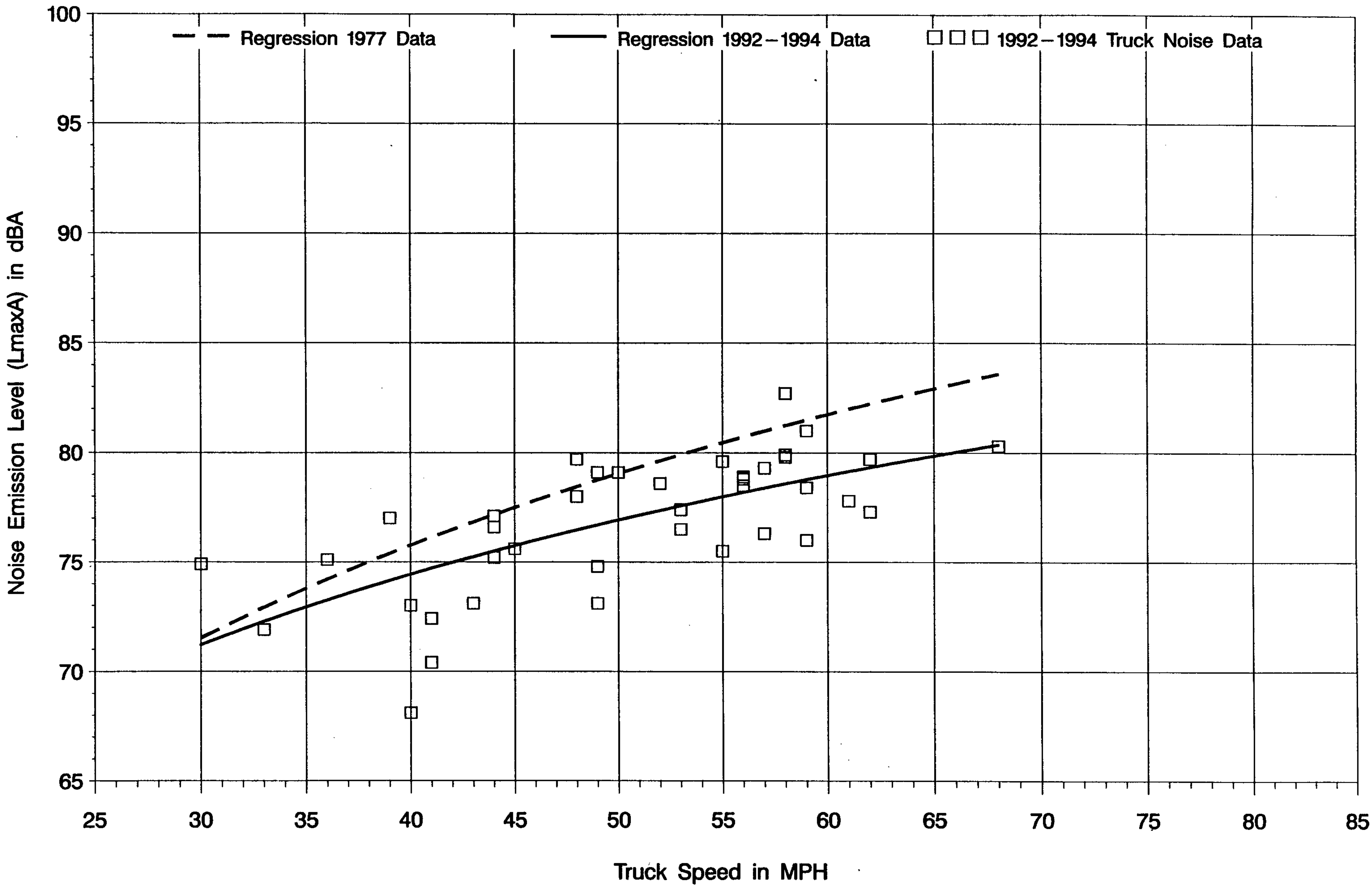


Figure B-7: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 1 (Controlled Access, Level) - HEAVY TRUCKS

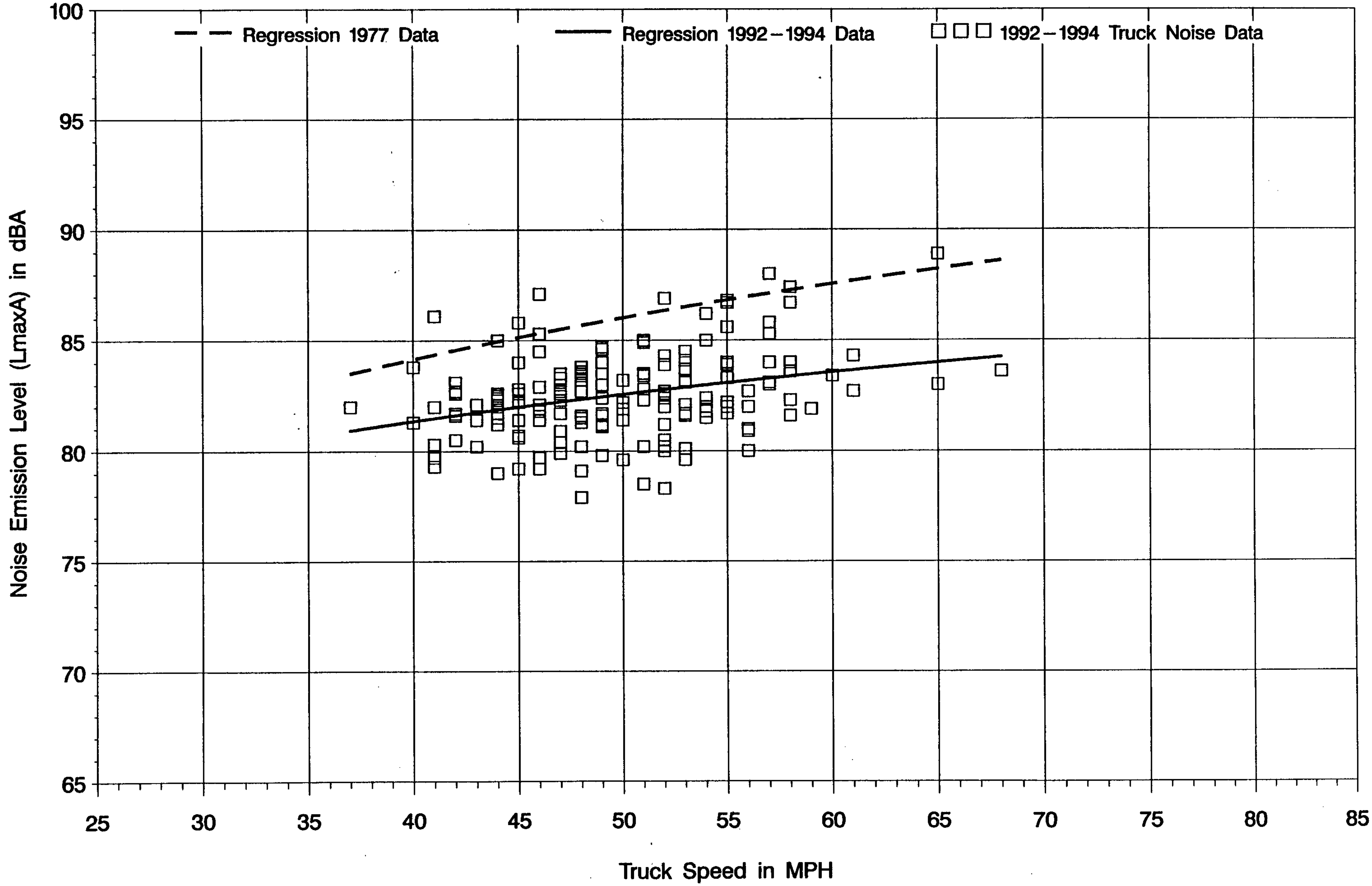


Figure B-8: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 2 (Controlled Access, Upgrade) -- HEAVY TRUCKS

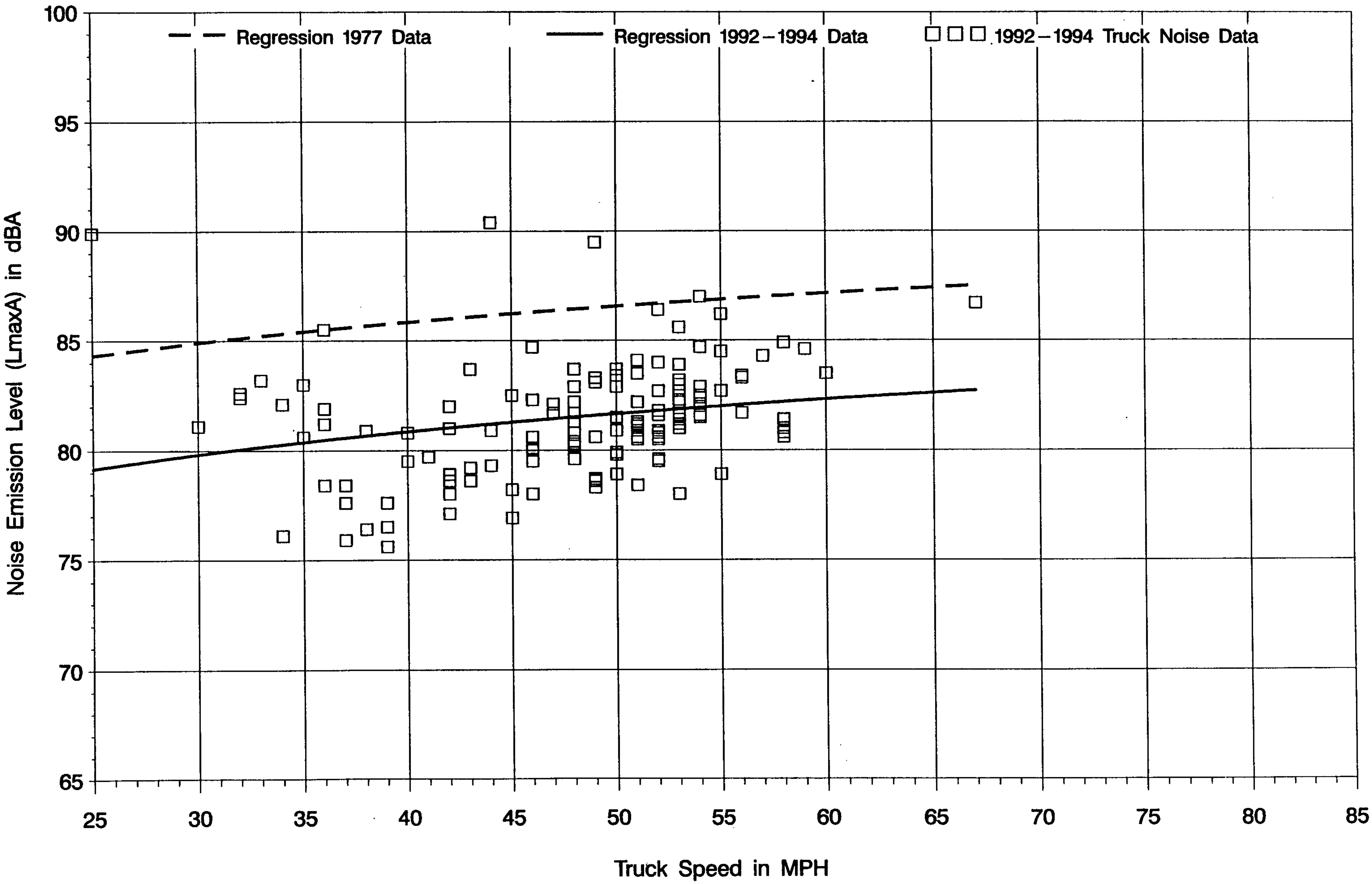


Figure B-9: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 3 (Controlled Access, Downgrade) - HEAVY TRUCKS

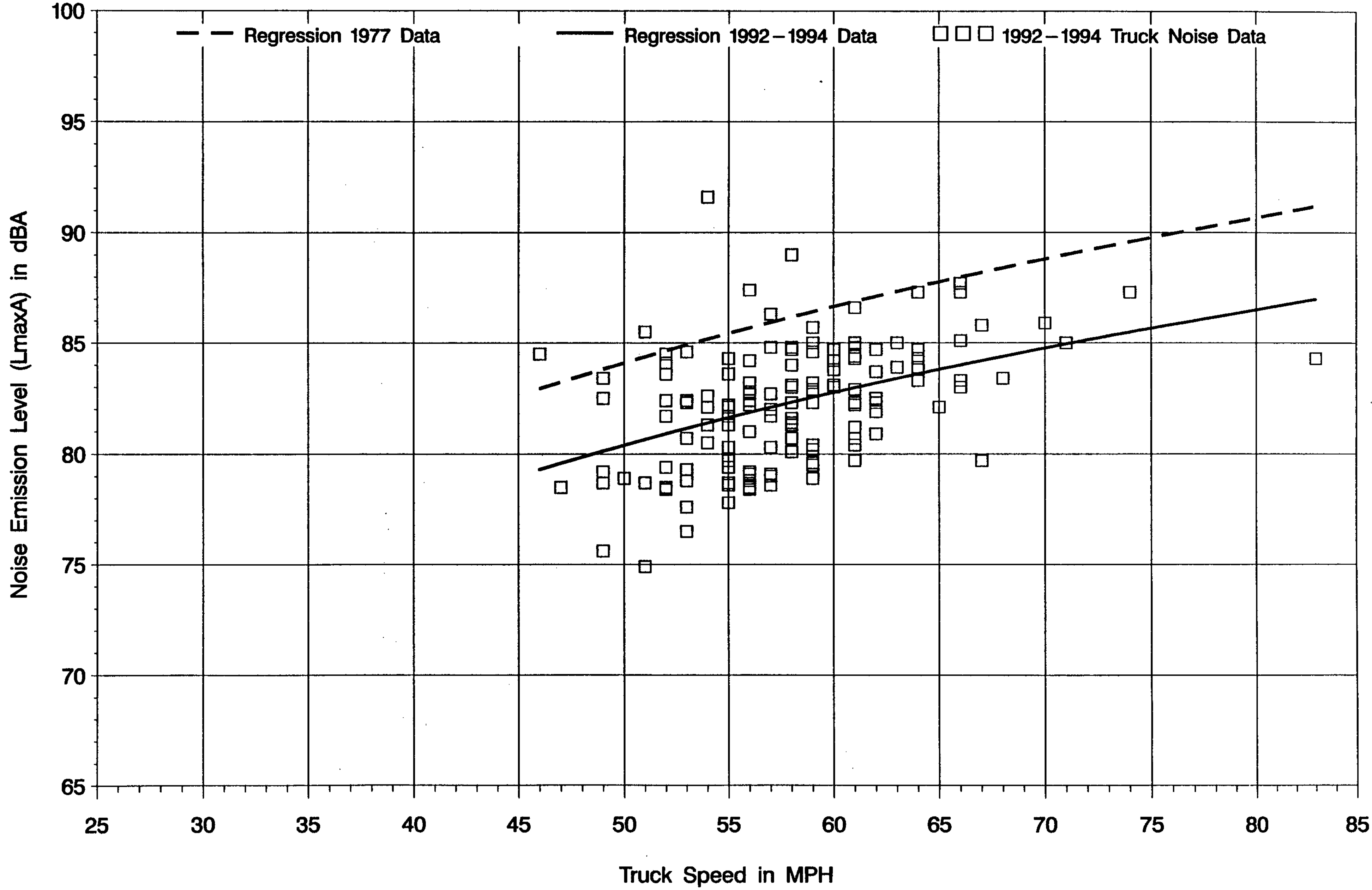


Figure B-10: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 4 (Non-Controlled Access, Level) - HEAVY TRUCKS

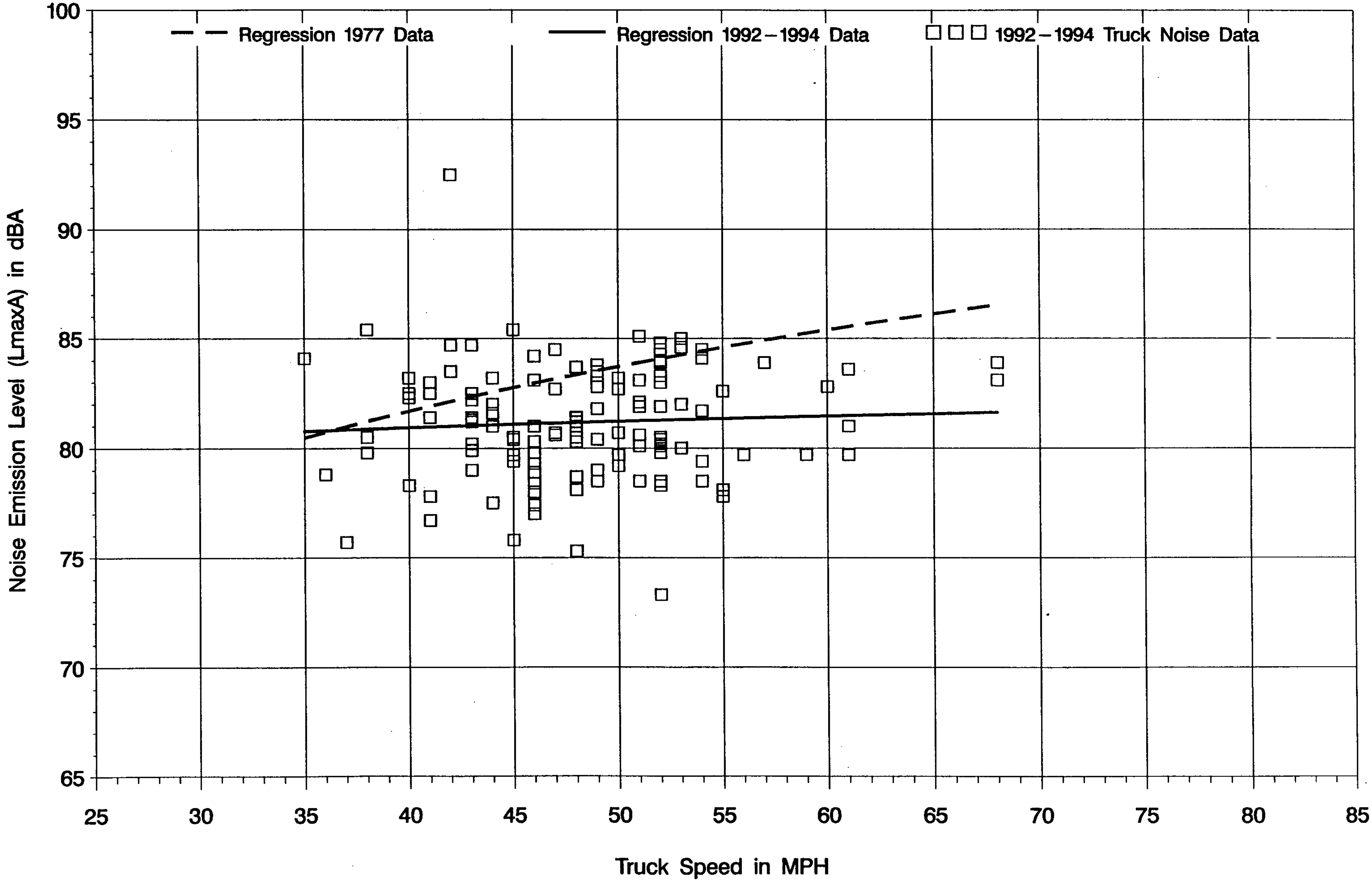


Figure B-11: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 5 (Non-Controlled Access, Upgrade) - HEAVY TRUCKS

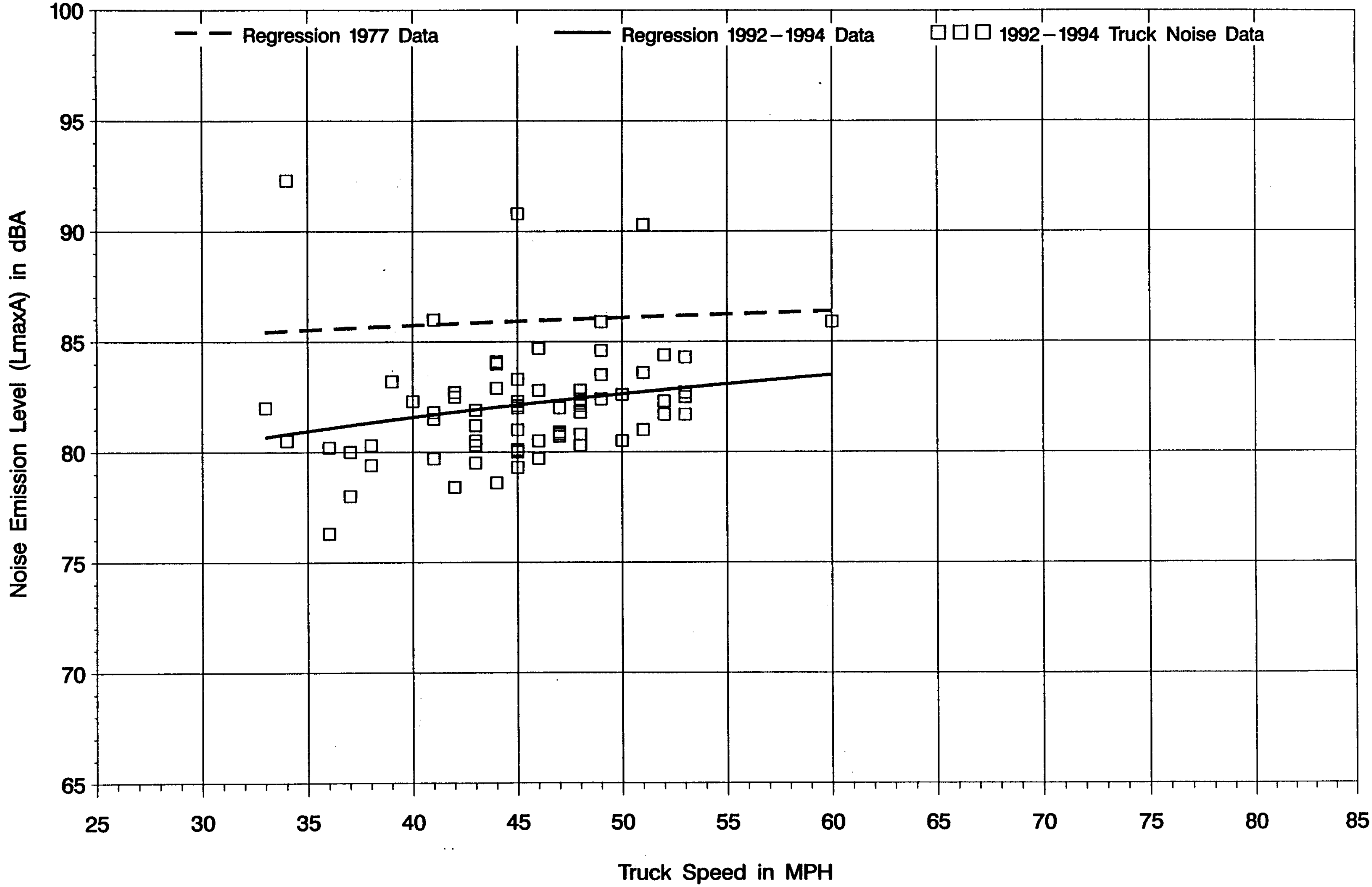
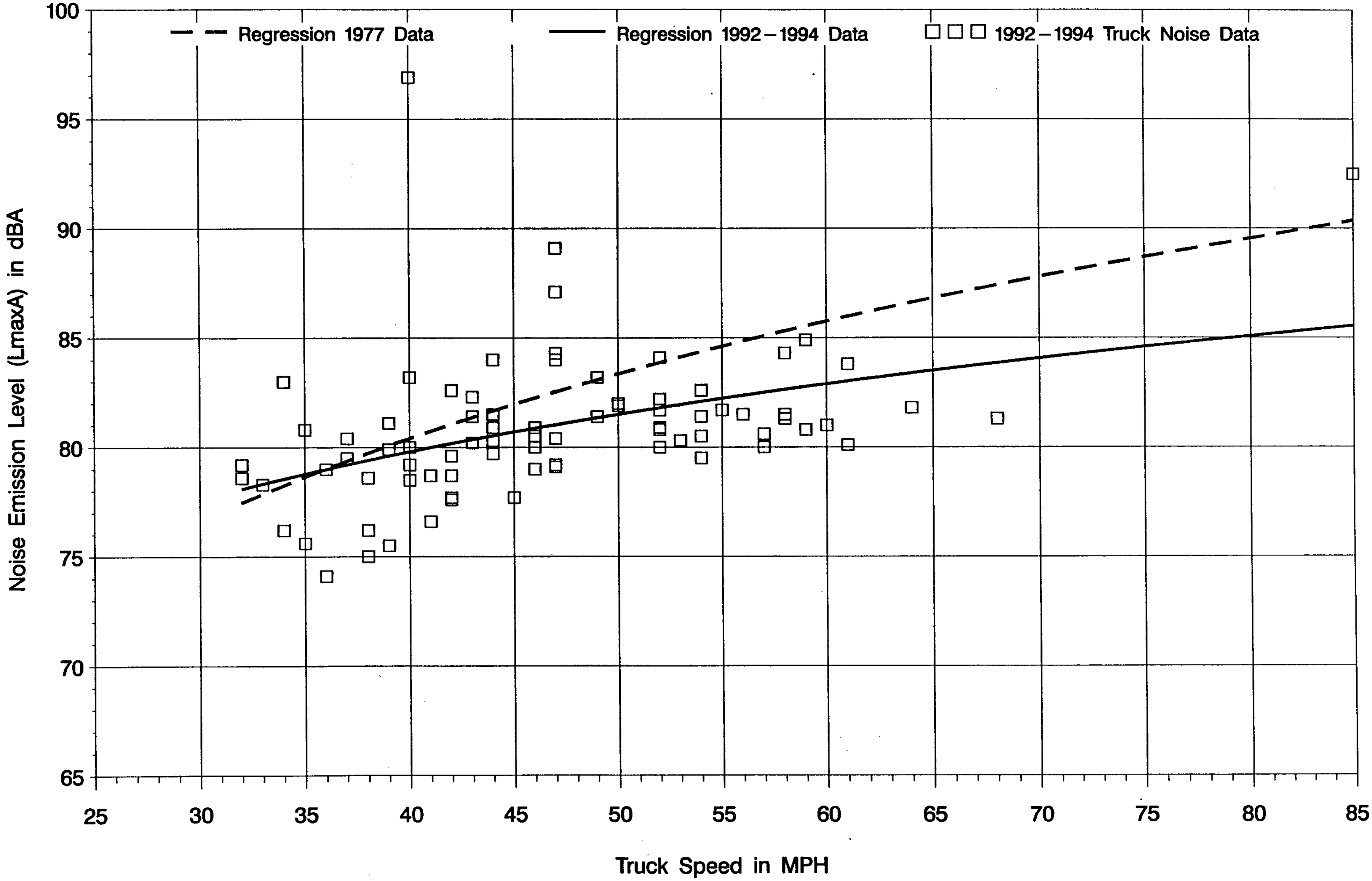


Figure B-12: Noise Emission Level (LmaxA) vs. Truck Speed
ROADWAY TYPE 6 (Non-Controlled Access, Downgrade) - HEAVY TRUCKS



APPENDIX C

Printouts of Field Data

This appendix includes the noise, speed, and descriptive data collected for the trucks measured in this study. The L_{MaxA}, the maximum A-weighted passby level at 50 feet, is shown for each truck as well as the 1/3 octave band frequency information from 50 Hz to 10K Hz. The measuring microphone was at a height of four feet above the ground. Noise levels are given in dBA. Speeds are in miles per hour. Speeds which were calculated as explained under "Speed Data", Pages 30-31, are identified with an asterisk. The printouts are broken down into Truck Class and Roadway Type groups. For example, Figure C-1 lists the data for Truck Class 1 (Medium Trucks & Buses) for Roadway Type 1 (Level, Controlled Access Roadways). The descriptive data headings are explained below.

SOBS	Site Number-Observation Number
DATE	Date the measurement was taken.
AXL	Vehicle Axle Category
VT	Vehicle Type
XH	Exhaust Configuration (H = horizontal, V = vertical)
LC	Load Condition if possible (L = loaded, U = unloaded)

The vehicle axle categories as shown in Figure 1, Page 14 are as follows:

Axle Category	Axle Code
Two axle, dual tire rear wheels, single unit body	2
Three axle, single unit body	3
Four axle, single unit body	4
Two axle tractor, one axle semitrailer	2-1
Two axle tractor, two axle semitrailer	2-2
Two axle tractor, three axle semitrailer	2-3
Three axle tractor, one axle semitrailer	3-1
Three axle tractor, two axle semitrailer	3-2
Three axle tractor, three axle semitrailer	3-3

Vehicle type designations are listed on the next page.

Table C-1. Vehicle Type Codes

Vehicle Type	Code
Bottler	B
Camper	C
Car Carrier	CC
Cement Mixer	CM
Crane	CR
Delivery Van	DV
Dump	D
Flatbed	FB or F
Flatbed, Stake	FS
Garbage	G
Hopper	H
Pickup	PU
School Bus	SB
Tanker	T
Tow Truck	TT
Tractor (no semitrailer)	TR
Transit Bus	TB
Utility	U
Van	V
Wrecker	W

Figure C-1. Medium Trucks & Buses - Level, Controlled Access Roadways

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	1-23	10/07/92	2	FS	H	U	46*	32.1	49.8	50.4	48.7	53.7	54.0	54.7	57.2	62.4	61.8	64.8	63.4	65.3	70.4	70.4	68.4	66.6	65.0	62.0	59.4	55.2	53.8	54.7	46.4	77.3
2	1-48	10/13/92	2	T	H		47*	43.5	51.9	47.4	46.1	53.8	57.9	68.1	68.3	66.3	62.5	62.6	73.1	73.4	72.3	72.0	73.5	72.7	69.7	66.7	63.5	60.7	59.2	57.1	49.7	82.0
3	1-54	10/13/92	2	V	H		45*	45.7	50.3	61.7	59.0	64.2	60.4	69.5	67.0	64.8	67.8	65.8	64.6	68.3	69.9	71.7	71.4	67.9	64.8	62.5	59.9	58.2	56.9	56.4	54.0	79.8
4	2A-4	09/14/92	2	V	H		47*	36.6	40.5	54.2	56.3	53.3	61.1	65.6	79.9	75.2	65.1	75.8	67.2	65.4	68.6	70.0	69.6	67.4	65.5	65.7	68.1	61.2	60.0	57.2	54.9	83.7
5	2A-14	09/14/92	2	SB	H		51*	42.7	45.1	52.4	49.6	58.9	65.0	63.0	62.7	60.7	73.7	74.6	62.9	66.6	67.7	70.5	67.8	66.0	64.2	60.7	58.2	55.6	54.9	51.0	46.2	80.0
6	2A-29	09/16/92	2	D	H		53*	32.9	42.3	41.8	54.6	55.6	56.1	57.5	65.7	64.3	66.9	76.6	65.8	64.9	71.1	68.4	68.6	66.6	65.7	62.0	59.5	57.7	54.5	53.9	47.8	80.2
7	2A-34	09/16/92	2	V	H		51*	38.0	40.8	46.4	46.5	59.6	53.7	59.5	57.0	61.1	76.0	73.8	61.3	62.9	65.7	68.4	66.5	64.6	62.1	60.3	58.2	55.9	53.9	52.9	47.9	79.7
8	2A-44	09/16/92	2	V	H		50*	44.7	39.1	42.3	46.3	51.0	50.3	57.6	60.4	63.3	76.6	67.8	63.3	64.1	66.7	68.1	64.9	64.7	62.5	59.5	56.7	54.0	52.4	52.0	48.1	79.1
9	2A-50	09/16/92	2	FS	H		51*	33.0	36.3	44.5	42.4	48.0	49.0	56.5	54.3	54.0	56.9	62.8	64.2	65.5	70.1	68.5	68.1	66.9	64.0	61.2	59.3	57.3	54.7	52.4	47.0	76.5
10	2A-64	08/24/94	2	V			53	39.4	45.6	49.4	50.5	53.1	64.5	56.7	59.5	67.7	62.4	64.6	67.7	66.4	68.4	71.9	71.1	69.0	67.2	64.1	61.5	59.4	57.5	57.4	49.4	79.0
11	2A-67	08/24/94	2			U	41	33.0	37.5	49.6	50.4	50.5	52.0	47.8	50.7	53.0	52.0	60.6	61.5	59.3	64.7	63.4	66.0	63.5	59.2	56.7	54.5	52.8	51.0	56.4	44.8	72.6
12	2A-69	08/24/94	2	D			48	44.4	38.2	55.6	49.4	59.2	62.7	64.4	62.0	62.3	76.7	67.9	72.2	69.0	66.2	67.6	66.8	66.0	63.6	61.0	58.9	57.0	54.7	57.6	48.4	80.5
13	2A-77	08/24/94	2	V			55	38.7	42.1	45.3	51.9	55.4	61.5	62.7	62.0	66.6	78.6	62.4	64.9	74.6	68.3	70.2	70.9	68.7	66.1	65.4	63.0	60.5	59.5	59.4	52.9	82.2
14	2A-78	08/24/94	2	T			51	32.5	51.0	46.6	51.6	52.0	54.8	57.3	58.7	61.8	62.1	70.0	65.1	62.5	75.1	67.6	73.2	65.8	64.8	62.1	60.2	56.6	55.4	57.8	47.7	79.5
15	2A-86	08/24/94	2	DV		L	53	41.3	37.4	47.4	53.1	58.4	56.8	57.7	60.9	62.0	65.6	75.0	70.1	64.4	67.8	66.7	68.3	65.6	64.9	61.1	59.0	56.9	54.5	57.2	47.6	79.1
16	3-3	10/21/92	2	V	H		52*	32.6	36.5	40.2	46.0	55.8	52.5	60.3	57.9	57.0	62.4	65.5	68.4	71.5	74.5	68.6	65.7	62.9	61.4	60.3	57.4	54.7	52.8	49.4	45.0	78.7
17	3-15	10/21/92	2	V	H		49*	41.2	47.5	46.2	51.1	60.9	57.0	61.1	65.6	65.5	67.6	71.6	69.8	69.3	69.8	69.0	66.9	66.0	64.4	61.9	59.5	57.2	54.6	52.7	47.8	79.1
18	3-16	10/21/92	2	T	V		44*	36.0	41.4	44.8	55.6	56.8	55.8	59.7	61.5	77.4	66.5	69.9	73.5	73.9	70.9	69.8	68.8	68.6	68.2	64.3	62.4	59.8	57.6	53.9	50.2	82.3
19	3-19	10/21/92	2	V	H		48*	35.3	38.8	42.5	41.1	50.4	50.7	51.6	58.6	60.1	66.3	66.1	69.7	73.6	74.4	70.4	68.6	65.2	65.3	61.9	59.6	54.0	51.5	48.4	44.8	79.9
20	3-47	10/21/92	2	V	V		47*	39.1	41.3	47.7	50.5	54.6	55.3	55.1	59.8	67.5	71.4	71.1	69.1	69.1	71.4	70.2	66.1	66.9	65.6	61.6	58.7	56.4	53.6	51.8	48.2	79.6
21	3-50	10/21/92	2	V	H		45*	34.7	43.3	49.2	59.3	54.7	60.9	77.4	79.6	72.3	71.6	75.4	72.9	73.8	70.2	67.8	66.5	65.4	64.3	60.2	58.7	55.5	54.6	51.3	47.1	84.6
22	4-5	8/08/94	2	V			61	38.6	41.4	43.0	50.3	52.2	59.1	58.0	62.8	59.2	62.6	66.3	65.6	66.3	69.0	70.0	69.3	67.2	66.8	65.3	62.0	61.1	59.3	54.9	50.2	78.0
23	4-11	8/08/94	2	V			42	32.9	40.0	46.7	53.6	53.6	53.4	60.6	58.5	62.6	60.3	58.4	65.2	66.8	68.0	64.8	66.2	63.4	63.1	58.5	57.0	54.4	51.0	50.2	41.2	75.3
24	4-13	8/08/94	2	V	V		48	30.0	37.9	46.7	48.1	50.6	53.3	54.0	57.5	55.1	62.5	60.7	63.1	66.9	67.2	67.7	66.0	63.8	62.8	60.3	57.8	55.3	52.4	52.8	45.0	75.2
25	4-17	8/08/94	2	C			59	35.1	43.5	44.7	49.4	53.5	57.1	56.0	63.7	59.0	61.2	63.8	66.9	68.1	70.9	71.1	67.0	65.2	63.4	62.5	61.1	59.9	58.7	56.7	52.8	77.8
26	4-18	8/08/94	2	D			43	33.9	52.0	52.9	58.6	59.2	61.8	56.5	67.1	70.6	62.3	71.4	70.5	71.4	72.6	71.3	67.9	67.0	64.7	61.0	58.9	56.3	54.0	53.9	48.1	80.4
27	4-21	8/08/94	2	V			51	44.2	46.8	46.2	51.9	52.9	55.7	59.8	59.8	60.2	60.7	67.2	69.8	71.5	71.6	68.1	64.8	63.8	63.1	59.1	56.0	53.9	50.8	52.2	46.2	78.1
28	4-24	8/08/94	2	FB		U	53	39.7	36.6	49.0	56.4	57.0	55.6	59.0	63.8	63.3	65.1	76.1	72.8	68.2	70.7	69.4	66.3	66.2	62.8	60.2	58.6	56.5	54.6	55.0	47.0	80.4
29	4-25	8/08/94	2	D			53	35.7	43.5	48.2	50.0	59.6	55.3	58.7	71.9	62.7	61.5	69.5	67.8	70.4	71.5	69.2	67.4	66.5	65.2	62.4	59.4	57.9	54.3	54.4	46.7	79.4
30	4-35	8/08/94	2	V			58	41.8	48.8	53.9	55.3	58.3	57.4	61.9	64.9	61.3	63.1	74.0	75.0	75.9	74.7	71.9	71.8	69.2	66.0	64.5	63.3	57.4	55.1	54.2	46.5	82.7
31	4-40	8/08/94	2	V	H		61	48.7	45.3	48.6	52.1	52.6	60.7	61.5	60.5	60.3	65.0	66.4	69.4	69.5	71.7	73.3	69.9	68.2	66.0	61.9	59.7	56.7	55.8	56.1	49.7	79.6
32	4-44	8/08/94	2	U			65	39.9	40.1	48.5	50.4	55.9	58.3	57.8	61.2	59.6	64.5	70.2	70.6	71.0	71.7	70.4	66.1	65.0	64.2	61.1	59.2	57.3	55.7	54.4	49.6	79.1
33	5-2	8/9/94	2	V	V		50	43.3	45.6	48.5	56.5	50.1	53.2	58.8	58.5	61.1	60.7	71.4	66.2	63.5	66.9	67.5	66.6	65.1	63.2	59.7	59.5	54.4	52.1	50.1	46.3	76.8
34	5-4	8/9/94	2	V	H		51	28.3	35.7	39.9	49.6	44.6	53.8	54.3	52.7	57.2	60.0	63.8	63.0	65.4	68.1	67.8	65.3	63.2	61.0	57.8	56.4	54.6	53.0	50.0	45.4	74.9
35	5-5	8/9/94	2	V			48	42.3	43.7	48.9	54.8	56.8	59.3	67.8	72.8	74.6	68.4	77.2	78.3	76.7	71.4	71.7	70.4	67.8	66.8	63.2	60.5	57.1	54.7	51.2	45.2	84.5
36	5-6	8/9/94	2	V			53	38.5	40.9	49.7	50.2	57.8	55.4	55.9	56.8	58.2	59.8	64.3	64.3	63.8	64.4	64.2	62.5	62.4	59.1	56.1	54.7	56.9	55.4	51.5	46.4	73.6
37	5-12	8/9/94	2	U			57	32.0	40.2	52.4	50.6	51.8	57.6	61.7	67.2	67.6	65.9	65.1	66.5	70.6	68.2	70.2	67.5	66.6	65.8	63.5	62.0	59.4	57.7	54.8	51.9	78.7
38	5-20	8/9/94	2	V			55	42.0	38.4	43.8	50.1	51.1	56.8	58.5	63.3	60.7	68.9	77.0	68.4	68.7	70.9	70.4	70.1	67.2	66.0	63.6	61.1	57.6	55.6	53.2	50.1	81.0
39	5-24	8/9/94	2	DV			49	35.4	36.6	40.1	48.5	47.3	54.6	55.3	56.5	59.7	62.9	64.4	67.6	66.1	66.1	63.8	64.0	65.2	62.5	59.9	56.6	54.1	53.4	51.8	48.5	75.2
40	5-25	8/9/94	2	V			53	36.9	41.6	44.5	53.2	52.8	55.9	56.6	62.7	61.7	66.9	68.5	67.3	67.9	69.6	70.8	69.9	67.6	66.9	65.8	62.9	62.2	59.2	56.9	53.2	79.0
41	5-26	8/9/94	2	V			47	40.2	47.3	49.7	55.0	51.2	55.8	54.7	57.7	63.8	62.1	63.5	73.5	64.7	66.0	66.3	64.5	62.2	60.5	56.2	54.5	52.2	49.8	45.7	41.7	76.9

Figure C-1. Medium Trucks & Buses - Level, Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	5-30	8/9/94	2	V			46	38.3	43.6	48.8	49.0	60.2	51.2	54.5	57.1	58.8	64.0	73.0	65.0	62.6	67.8	68.5	64.8	63.7	61.3	58.8	55.7	54.4	53.2	48.8	44.3	77.2
43	5-33	8/9/94	2	D			44	35.2	37.3	42.0	47.3	54.1	54.3	61.2	63.4	63.2	66.5	71.9	66.9	67.4	68.0	64.7	64.4	61.3	59.2	58.2	54.8	53.0	50.4	47.8	43.7	77.2
44	5-38	8/9/94	2	SB			48	42.1	42.9	44.0	48.8	51.8	56.0	59.1	57.7	59.6	65.2	62.4	65.2	66.6	66.1	68.9	68.5	66.9	64.6	62.0	59.6	56.8	54.4	51.5	48.0	76.6
45	5-41	8/9/94	2	V			41	27.5	33.1	36.0	44.3	44.8	47.2	48.7	48.7	51.1	56.1	57.4	60.3	60.4	63.5	64.8	64.8	61.7	58.5	55.4	51.9	48.4	45.9	42.7	38.2	71.7
46	5-46	8/9/94	2	V			50	34.2	42.6	47.1	48.9	53.2	56.3	57.7	59.3	62.7	63.6	63.7	65.9	67.0	67.4	69.0	66.2	65.1	63.5	62.2	58.8	57.1	53.8	51.8	47.3	76.4
47	5-51	8/9/94	2	T	V		51	39.1	38.4	47.8	49.2	59.8	58.3	54.8	60.3	66.7	63.1	67.0	66.5	64.0	67.2	67.3	65.9	65.3	63.7	60.7	58.5	56.4	53.2	50.0	46.7	76.5
48	5-52	8/9/94	2	D	V		48	42.4	40.8	45.7	53.6	66.9	55.3	58.9	60.4	62.2	62.7	74.5	65.7	61.7	66.1	64.4	63.7	61.4	60.6	57.8	55.7	52.8	51.6	48.1	44.5	77.6

Figure C-2. Medium Trucks & Buses - Upgrade, Controlled Access Roadways

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAXA
1	6-19	10/22/92	2	V	H		40*	38.4	41.3	70.6	62.5	57.6	67.3	63.5	65.2	67.3	68.4	74.1	70.0	73.1	78.6	72.2	69.9	69.2	64.9	64.2	64.5	60.8	57.0	51.9	47.0	83.3
2	6-31	10/22/92	2	V	H		48*	36.9	48.2	49.1	55.6	61.6	57.4	54.0	61.0	64.1	63.0	60.2	67.4	67.9	69.8	73.1	71.0	68.6	69.1	67.4	63.9	61.1	57.1	53.6	50.9	79.5
3	6-34	10/22/92	2	V	V		48*	37.3	34.7	52.3	51.6	62.2	60.8	67.3	58.9	61.4	61.3	64.3	77.0	70.2	68.2	68.4	66.8	64.9	63.8	61.6	59.3	56.7	54.6	54.3	53.0	80.1
4	6-57	11/23/93	2	D	V	L	48	37.1	49.7	57.9	46.7	52.0	50.3	54.5	56.9	56.7	60.1	71.0	66.1	70.6	77.1	72.2	71.4	69.4	67.4	64.2	60.7	55.1	53.7	51.8	49.2	81.2
5	6-58	11/23/93	2	V	H		51	38.6	43.6	55.8	46.5	53.2	55.6	58.6	56.0	54.3	59.4	61.7	60.5	66.1	72.1	70.0	69.5	68.1	65.4	61.2	58.4	56.2	52.4	48.7	46.4	77.6
6	6-99	11/23/93	2	V	H		41	43.5	46.7	45.5	61.5	60.3	59.4	61.9	59.5	68.5	74.1	64.6	69.2	68.7	68.4	70.1	68.1	66.8	67.0	64.0	61.9	57.1	53.5	50.9	50.0	79.8
7	7-1	8/1/94	3	TB			51	35.8	41.4	55.0	52.9	64.0	71.8	64.6	67.5	70.4	70.8	68.8	68.3	69.4	67.7	69.4	68.0	66.5	65.8	64.6	62.8	61.2	61.6	58.9	58.1	80.5
8	7-5	8/1/94	2	V			47	43.8	40.1	47.3	58.5	50.2	57.7	54.2	56.8	57.9	67.7	58.4	60.6	66.9	63.9	65.4	66.1	64.7	63.8	60.2	57.3	54.1	51.4	51.8	47.3	75.2
9	7-8	8/1/94	2	V			44	38.4	38.1	41.6	40.8	53.0	47.4	44.6	47.7	46.7	59.0	57.8	58.2	60.1	59.8	60.1	59.1	56.7	54.0	50.6	47.4	45.7	46.0	46.8	41.6	68.7
10	7-9	8/1/94	2	V			52	35.3	36.6	56.1	56.7	56.3	59.2	57.9	56.1	58.7	58.1	68.7	63.9	61.9	67.1	65.1	65.5	63.2	61.3	59.8	57.4	53.9	50.4	50.4	47.2	75.2
11	7-28	8/1/94	2	V	V		55	33.3	51.4	46.7	45.7	55.7	55.2	59.6	57.4	61.9	60.8	59.1	61.1	62.2	64.0	64.1	63.9	62.6	62.1	59.4	56.8	54.7	50.9	49.1	46.8	73.4
12	7-36	8/1/94	2	FB			45	51.6	47.1	52.7	49.5	51.2	62.4	54.2	54.7	54.5	56.4	55.3	58.7	59.9	60.6	62.4	61.6	61.3	61.3	57.5	54.5	53.4	51.8	50.5	49.5	71.5
13	7-39	8/1/94	2	V			49	42.4	48.2	46.8	53.5	59.2	74.8	73.5	68.2	65.1	64.1	65.1	63.5	65.1	64.4	64.3	64.2	64.0	62.1	60.1	58.9	57.1	56.4	54.4	51.0	79.6
14	8-3	12/08/92	2	V	H		59	41.7	40.7	43.8	50.5	51.0	51.1	55.2	56.3	56.8	64.7	66.1	69.9	70.7	71.5	72.2	70.9	69.2	67.5	66.0	63.1	60.4	58.4	56.6	54.9	79.8
15	8-4	12/08/92	2	V	H		51	42.8	47.0	52.3	51.0	61.1	57.9	52.8	55.3	61.7	65.1	69.2	71.3	71.8	71.1	68.6	68.4	65.8	63.5	59.8	57.5	54.3	52.3	49.4	47.4	79.0
16	8-14	12/08/92	2	F	H		53	36.6	41.1	51.6	45.8	60.6	51.9	56.0	55.2	56.0	64.5	66.9	67.0	69.6	74.1	74.2	72.0	69.4	66.8	64.3	60.7	57.2	54.8	52.1	49.6	80.4
17	8-18	12/08/92	2	D	H		52	41.4	44.9	54.3	54.6	61.8	60.4	70.9	65.1	71.9	78.6	75.0	70.1	68.5	69.0	71.5	68.5	67.0	66.6	64.1	60.5	58.1	56.2	55.1	53.1	83.0
18	8-21	12/08/92	2	V	H		58	45.7	45.9	48.2	48.4	62.3	60.9	55.4	55.5	64.5	66.1	77.6	70.0	70.9	75.6	70.4	68.9	66.7	64.0	62.1	58.0	55.6	54.2	50.8	47.7	81.9
19	8-42	7/21/94	2	U			46	36.6	33.5	53.4	50.0	47.4	52.4	58.1	57.6	60.0	66.4	62.8	69.9	73.1	65.8	66.0	64.8	64.2	60.4	60.7	57.1	54.7	55.0	53.1	49.3	77.5
20	8-49	7/21/94	2	V			49	35.0	43.6	46.4	49.6	56.1	50.4	59.2	58.2	69.6	62.8	69.8	70.8	68.0	78.2	71.6	68.4	65.4	65.2	62.3	60.4	57.4	55.0	53.9	53.3	81.4
21	8-53	7/21/94	2	V			52	34.5	39.2	45.2	45.5	54.8	52.4	57.2	59.7	59.9	61.0	68.6	65.6	72.7	70.7	69.0	67.9	65.3	64.2	62.6	59.4	56.4	52.9	50.8	46.9	78.4
22	8-63	7/21/94	2	V			55	42.4	43.2	48.3	52.0	52.1	55.9	56.4	57.7	58.8	62.5	63.5	64.8	68.1	67.6	67.0	68.5	66.2	63.2	61.0	59.4	56.7	55.0	53.5	49.5	76.4
23	8-66	7/21/94	2	V			47	41.3	45.5	48.9	45.6	56.7	52.3	52.8	59.9	57.9	61.5	67.4	67.3	66.6	70.3	70.3	66.9	64.6	63.6	61.9	59.9	57.6	56.3	53.8	48.3	77.4
24	8-70	7/21/94	2	SB			53	41.0	38.3	45.8	50.0	52.3	56.9	61.2	59.0	55.9	58.9	71.5	66.6	70.0	73.4	70.8	69.4	67.9	65.7	63.1	59.1	56.9	55.0	52.6	48.4	79.5
25	8-72	7/21/94	2	V			59	37.5	45.5	48.2	49.6	51.0	60.0	59.7	61.1	62.1	61.8	67.9	66.2	68.7	69.9	69.8	66.9	66.7	64.9	63.8	62.3	61.6	59.5	59.8	57.7	78.1
26	8-74	7/21/94	2	V			53	37.5	38.0	43.7	49.9	52.9	64.2	59.5	60.5	64.8	59.9	66.8	71.5	68.9	71.2	72.8	72.0	71.3	70.7	69.0	67.3	66.8	65.8	64.7	62.4	81.3
27	8-77	7/21/94	2	V	V		45	44.6	50.5	47.4	56.0	55.6	55.7	55.9	66.1	60.3	72.4	64.0	64.8	69.1	65.4	66.3	64.4	63.3	59.8	58.1	56.6	55.1	53.5	52.6	50.9	77.3
28	11-7	09/17/92	2	V	H		49*	45.7	42.1	47.0	60.7	58.7	54.0	57.4	61.7	58.4	64.8	75.2	66.4	64.3	68.7	69.5	66.9	66.7	64.7	62.4	61.2	60.8	62.2	57.0	51.1	79.2
29	11-17	09/17/92	2	V	H		54*	35.1	40.6	38.4	52.4	54.6	55.0	57.5	58.4	59.4	63.6	67.4	70.2	68.4	70.6	70.3	71.9	69.4	68.4	64.9	62.9	60.5	59.3	56.6	52.3	79.5
30	11-21	09/17/92	2	V	H		51*	34.0	46.3	54.5	53.2	62.2	58.5	60.5	62.2	64.1	64.0	78.2	70.0	67.2	66.3	66.0	65.1	63.8	62.4	59.9	57.5	55.4	54.2	54.8	48.2	80.4
31	11-25	09/17/92	2	V	H		52*	40.4	47.9	52.3	62.0	60.3	60.6	63.8	59.9	61.9	65.7	68.2	77.1	71.1	71.1	70.6	67.0	67.7	64.7	61.6	59.2	56.2	56.5	55.5	52.6	81.0
32	11-29	09/17/92	2	V	H		49*	35.5	64.0	44.7	54.0	56.3	61.0	57.0	60.3	62.3	64.3	65.1	66.1	73.0	72.1	67.9	66.8	65.4	63.2	61.3	59.5	56.9	56.1	54.3	50.0	78.7

Figure C-3. Medium Trucks & Buses - Downgrade, Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	12-2	12/03/93	2	F			54	37.3	48.7	48.4	51.1	58.8	66.3	60.1	68.8	61.9	64.5	65.0	65.4	69.7	70.2	72.0	69.9	67.4	64.2	62.1	59.8	54.8	52.6	49.7	46.3	79.1
2	12-15	12/03/93	2	V			61	37.8	43.2	47.8	57.1	51.0	53.1	57.0	52.6	54.1	55.9	56.6	61.9	67.4	66.6	69.0	69.4	66.1	64.8	59.3	55.0	52.3	49.1	46.1	42.8	76.0
3	12-23	12/03/93	2	V			61	37.7	44.3	50.4	48.0	64.7	55.6	59.6	60.0	65.1	75.9	74.6	62.3	70.7	74.9	70.1	72.0	68.5	65.3	62.9	60.9	57.5	54.4	50.0	46.0	82.1
4	12-31	12/03/93	2	V			49	39.7	49.0	58.5	56.0	54.4	63.1	55.6	60.5	64.2	66.5	77.5	64.7	61.0	68.6	71.4	70.0	68.3	65.1	61.9	58.2	54.6	52.4	50.4	48.3	80.7
5	12-38	12/03/93	2	U			52	36.1	42.2	43.7	51.2	48.3	61.7	53.1	56.9	60.2	59.5	59.3	70.2	63.9	68.8	75.4	68.9	66.9	62.0	60.4	59.1	57.4	57.7	57.5	57.1	79.0
6	12-40	12/03/93	2	V	V		70	42.7	51.0	53.5	54.5	52.7	55.5	62.2	63.1	65.2	64.5	68.9	61.6	65.1	74.3	72.3	72.2	70.9	69.3	66.6	63.2	60.0	57.3	52.8	48.4	80.5
7	12-60	12/03/93	2	FS		L	70	41.1	45.6	48.3	52.0	54.4	56.7	59.7	58.4	62.0	64.4	70.7	64.1	66.9	70.4	69.7	69.6	67.6	64.6	64.6	60.7	58.7	55.8	51.5	46.4	78.4
8	13-26	12/07/93	2	V			71	42.2	47.5	52.8	54.2	58.2	62.0	60.5	58.1	60.2	66.0	70.9	82.2	75.1	72.6	72.8	72.3	71.4	69.1	66.2	65.8	63.2	58.7	53.6	48.8	84.9
9	13-35	12/07/93	2	V			71	41.1	45.0	50.8	47.5	53.4	62.8	59.5	58.6	62.6	66.6	68.5	71.2	72.4	71.9	71.2	71.9	69.9	67.8	66.4	63.1	60.5	58.7	55.8	52.4	80.7
10	13-36	12/07/93	2	V	H		54	42.6	45.2	45.3	51.1	53.3	60.4	61.7	58.2	68.5	66.1	69.7	67.8	69.4	67.4	67.6	68.2	66.0	65.0	61.6	59.5	56.1	53.2	49.8	46.4	78.3
11	13-40	12/07/93	2	TB	H		68	41.4	41.7	47.9	51.8	52.8	55.7	54.9	56.3	59.7	66.2	69.2	67.9	71.2	74.1	73.5	70.1	67.9	66.0	63.0	61.7	59.1	55.5	51.4	47.9	80.3
12	13-42	12/07/93	2	FS			63	38.6	43.4	48.7	46.5	51.1	53.9	52.5	57.8	60.8	59.2	61.5	67.5	73.6	74.9	72.6	68.3	67.6	66.6	65.5	62.9	59.2	57.0	53.7	49.1	80.3
13	13-44	12/07/93	2	V			59	39.6	43.1	45.6	50.8	52.7	57.9	58.0	61.4	59.6	66.9	71.8	78.9	70.9	69.0	69.3	69.2	68.1	66.8	64.9	63.3	61.6	59.4	55.5	51.2	82.0
14	14-8	06/24/93	2	FS		L	54	40.2	43.0	47.7	56.1	58.4	50.2	58.6	56.1	64.1	62.1	65.1	74.8	71.1	68.2	69.8	69.0	69.7	67.1	65.2	62.2	59.6	55.5	52.2	47.7	79.9
15	14-30	06/24/93	2	V	H		49	39.6	43.7	43.7	47.8	57.7	52.9	53.7	52.1	62.2	64.4	60.3	70.0	69.4	67.3	67.6	65.4	65.0	62.5	60.1	57.9	55.6	52.8	49.4	45.6	76.8
16	15-10	8/11/94	2	V	V		51	42.4	45.5	48.8	51.3	58.2	56.9	62.4	58.3	65.4	60.7	63.3	66.3	65.0	67.9	69.2	68.5	67.1	66.9	63.5	61.1	58.3	55.8	52.9	48.3	77.4
17	15-11	8/11/94	2	V			57	43.9	43.6	50.8	54.9	51.5	64.5	58.0	60.2	63.0	63.8	67.6	68.4	67.8	67.5	68.3	66.4	65.1	63.5	62.1	60.6	57.8	55.1	53.0	49.6	77.4
18	15-13	8/11/94	2	V			55	42.7	36.0	50.9	47.7	55.5	61.7	54.2	58.0	59.2	62.3	70.7	65.3	65.7	68.5	67.9	67.2	66.1	64.3	61.6	59.1	56.1	54.2	51.6	48.5	77.2
19	15-16	8/11/94	2	DV	V		55	42.4	43.2	50.8	51.6	63.3	57.1	53.5	56.3	55.5	60.7	68.5	63.9	64.7	66.2	65.2	64.2	63.8	61.6	60.7	59.9	57.5	56.3	52.0	48.5	75.4
20	15-21	8/11/94	2	U			51	33.9	45.7	46.1	47.3	48.4	53.0	51.4	57.7	54.3	63.8	67.2	65.0	67.8	68.0	68.0	65.1	63.7	62.7	59.1	57.1	55.3	53.1	50.6	49.1	76.1
21	15-24	8/11/94	2	D			59	42.3	42.6	50.7	49.2	56.3	52.8	54.5	57.5	56.3	61.9	63.9	66.8	68.7	69.5	66.6	64.3	62.5	59.9	59.0	57.2	56.5	53.8	52.4	48.8	76.0
22	15-28	8/11/94	2	FB	V	L	51	35.1	47.0	45.8	47.0	48.2	59.8	56.2	60.3	58.7	61.5	67.4	72.7	69.1	68.4	67.7	65.1	63.4	61.9	59.1	57.6	57.1	56.2	54.1	52.1	77.8
23	16-3	8/3/94	2	V			57	42.0	44.5	46.5	48.6	50.6	53.3	56.7	57.8	54.3	60.9	73.8	73.0	65.2	66.8	65.0	63.9	62.8	61.4	59.3	59.2	59.3	58.7	56.1	53.6	78.3
24	16-19	8/3/94	2	TT			47	29.0	40.8	38.2	41.6	44.6	52.9	51.1	54.5	55.5	61.5	56.5	64.2	66.6	63.9	62.6	62.5	60.0	58.5	56.7	55.7	52.4	50.5	47.7	45.2	72.8
25	16-25	8/3/94	2	V			57	37.3	37.9	45.6	49.4	52.6	54.4	50.1	54.8	60.8	58.3	68.7	82.5	65.7	67.0	72.2	65.9	64.4	62.1	61.0	57.9	55.6	54.0	52.0	48.7	83.5
26	16-27	8/3/94	2	SB			57	35.7	37.2	44.5	44.7	49.6	58.0	52.5	54.5	56.1	60.8	71.9	64.6	63.4	67.7	65.9	66.7	64.9	62.0	59.1	57.7	56.3	53.8	53.2	48.4	76.5
27	16-34	8/3/94	2	V			52	41.8	42.1	40.9	61.8	50.9	73.5	58.6	70.0	65.9	65.6	67.8	65.9	65.9	65.4	65.4	64.0	64.5	62.9	61.9	58.7	59.3	57.5	56.3	54.4	78.8
28	16-42	8/3/94	2	V			57	50.0	37.5	50.9	56.4	53.7	60.2	57.9	56.5	58.0	62.0	68.6	69.5	64.4	69.3	68.4	66.3	64.1	63.0	60.2	58.8	56.3	55.1	52.4	48.7	77.1
29	16-44	8/3/94	2	DV			48	38.8	32.6	41.1	49.7	48.3	52.8	54.7	54.7	49.1	54.2	58.2	65.9	62.5	62.8	58.9	57.7	55.6	52.8	49.6	49.2	47.4	45.6	44.6	40.7	70.7

Figure C-4. Medium Trucks & Buses - Level, Non-Controlled Access Roadways

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	17-1	12/18/92	2	F	H	L	49	43.6	39.6	48.9	44.9	47.3	52.8	65.3	59.2	59.8	71.7	66.7	67.1	64.6	65.6	64.4	61.5	61.7	59.9	58.0	55.5	53.5	51.6	49.5	46.1	76.5
2	17-2	12/18/92	2	V	H		45	38.7	41.7	47.2	40.7	59.7	64.9	54.6	58.2	61.9	57.9	56.7	62.3	62.4	62.0	61.5	61.1	61.1	62.3	57.5	54.1	51.1	49.0	45.8	43.6	72.9
3	17-20	12/18/92	2	FS	V		49	38.6	42.3	44.7	48.6	56.9	54.4	57.0	57.0	61.3	58.3	62.3	68.6	64.3	66.9	68.0	68.5	67.4	67.2	63.5	60.8	59.4	55.7	52.3	47.9	77.0
4	17-21	12/18/92	2	SB	H		54	42.1	41.4	56.1	51.0	56.4	51.6	59.6	67.9	59.4	59.6	63.3	64.1	63.7	67.3	67.4	65.2	63.9	65.8	63.9	60.8	57.4	52.8	49.1	46.4	76.2
5	17-26	12/18/92	2	V	H		47	43.2	45.0	41.0	48.4	56.0	62.0	57.3	56.6	58.4	56.5	59.0	64.6	63.6	62.5	63.2	61.9	61.4	58.7	56.4	53.3	49.2	46.6	45.6	41.8	72.7
6	17-31	12/18/92	2	V	V		53	42.4	44.3	46.0	46.5	62.6	52.8	56.2	59.2	66.5	71.4	67.1	66.8	72.1	68.1	69.2	68.9	67.5	66.3	63.4	59.3	56.8	54.4	50.8	46.1	79.2
7	17-39	12/18/92	2	V	V		59	41.4	44.6	41.7	52.0	62.5	56.2	56.7	59.3	65.2	68.1	65.6	63.5	66.6	68.6	69.0	66.4	67.5	67.1	62.9	60.3	59.0	55.7	52.1	46.9	77.7
8	17-44	12/21/92	2	V			49	40.7	46.7	48.7	53.2	61.3	52.6	56.8	58.6	62.8	66.1	59.9	63.3	75.4	65.0	64.9	64.8	63.5	62.3	59.4	55.9	53.3	49.9	47.4	44.7	77.9
9	17-55	12/21/92	2	V			52	39.2	37.8	45.2	42.5	55.0	49.3	55.8	54.6	53.6	53.5	56.7	64.2	68.8	64.9	64.2	66.1	64.0	62.8	60.7	59.4	57.1	53.2	49.9	46.2	74.7
10	17-56	12/21/92	2	F			54	39.5	43.0	47.6	56.2	54.4	59.4	64.7	65.9	62.7	63.9	71.7	62.5	63.6	66.0	65.4	64.2	63.3	61.5	57.6	54.7	53.3	50.4	47.2	44.3	76.7
11	17-57	12/21/92	2	F			62	40.5	40.8	49.1	52.6	58.0	55.0	57.4	60.1	62.2	64.2	69.7	65.1	66.4	73.6	68.7	67.3	66.0	65.6	60.4	57.0	54.3	52.5	49.1	46.0	78.4
12	17-62	12/21/92	2	F		L	53	38.8	39.4	43.1	47.1	50.7	52.8	55.9	59.0	61.4	59.7	60.1	60.6	73.5	65.0	65.5	66.0	65.6	65.4	63.3	59.4	57.3	54.8	52.4	50.5	77.0
13	17-67	12/21/92	2	FS			56	41.2	38.2	42.9	44.0	47.2	48.2	52.3	51.7	63.5	58.1	57.4	68.8	67.5	68.8	69.2	66.4	63.2	60.7	58.0	56.0	53.4	52.1	49.8	46.6	76.3
14	17-71	12/21/92	2	T			47	43.5	40.0	48.9	49.8	50.3	54.0	69.4	59.6	71.1	70.0	62.4	64.2	66.7	69.2	66.9	65.6	63.9	62.9	59.3	56.4	55.0	51.8	48.5	45.6	78.2
15	17-74	12/21/92	2	F		U	45	42.8	50.7	47.2	53.5	50.5	47.2	60.8	57.6	56.0	64.6	61.5	56.3	63.3	63.5	65.9	64.8	62.3	60.5	57.9	56.0	53.6	50.4	48.7	44.9	73.6
16	19-5	11/18/93	2	V	H		47	39.0	38.6	43.4	47.4	47.4	49.7	53.0	54.4	58.5	58.3	59.8	63.5	66.0	68.6	66.4	63.0	64.4	61.5	61.3	58.5	55.2	53.8	51.2	46.9	74.8
17	19-14	11/18/93	2	DV			48	43.6	41.7	41.3	47.1	54.7	50.6	55.7	58.1	70.3	68.9	66.2	73.4	70.3	73.6	71.3	66.7	66.0	64.4	62.7	60.7	56.8	54.0	50.0	47.3	80.4
18	19-22	11/18/93	2	U			44	40.7	53.0	45.2	58.9	57.7	62.5	59.3	66.5	68.4	63.8	65.2	71.8	66.4	68.1	68.9	65.3	64.8	66.0	62.3	59.6	57.6	57.5	53.9	48.7	78.4
19	19-26	11/18/93	2	C			47	43.2	42.1	52.2	48.1	53.3	50.8	58.5	54.1	56.9	59.1	60.2	63.0	66.0	67.6	65.1	61.8	60.8	58.4	57.7	56.0	55.3	54.1	55.2	52.4	73.9
20	19-29	11/18/93	2	V	H		47	44.8	44.3	46.2	53.3	61.1	57.2	57.4	59.1	61.8	63.5	67.7	67.0	65.8	69.9	66.6	65.1	65.7	64.1	60.8	58.7	56.1	52.2	51.0	46.8	76.9
21	19-31	11/18/93	3	TB			44	43.1	45.4	46.2	46.9	65.8	58.7	55.0	65.1	64.4	66.2	66.9	68.9	70.8	72.3	68.2	68.5	66.5	65.2	62.2	60.0	58.3	55.5	53.1	49.0	79.2
22	19-39	11/18/93	2	V			47	41.6	45.6	45.5	53.4	57.5	58.9	69.5	59.6	62.2	72.5	65.9	66.9	69.3	71.0	71.0	67.6	69.0	69.8	64.8	61.9	57.5	55.2	53.0	49.3	80.1
23	19-43	11/18/93	2	FS		L	42	39.5	42.6	47.7	63.6	52.8	55.2	55.3	57.7	56.9	63.4	61.2	67.4	66.4	67.5	65.1	65.0	66.6	66.3	64.1	63.7	61.9	60.9	58.2	54.9	76.8
24	19-44	11/18/93	2	V	H		52	39.0	43.5	42.6	49.5	54.4	52.0	58.3	58.4	60.9	58.7	58.6	70.2	65.4	69.0	64.1	62.5	65.1	64.1	62.3	60.3	57.8	55.1	53.1	48.8	76.1
25	19-52	11/18/93	2	C			50	48.2	50.0	50.7	48.8	48.2	54.8	61.0	56.7	57.0	59.3	64.7	68.2	67.8	66.5	65.9	65.3	64.8	62.7	60.2	57.8	54.8	55.3	52.3	48.0	75.9
26	19-57	11/18/93	2	FS	V		43	42.8	47.3	50.4	74.6	52.2	54.9	66.2	59.5	64.9	72.9	76.5	76.5	71.0	76.7	76.7	76.9	75.0	76.1	75.3	68.6	64.6	59.6	51.1	48.3	86.2
27	19-58	11/18/93	2	V			52	38.5	42.5	43.3	43.6	50.4	51.9	58.8	54.2	57.3	59.6	62.9	63.1	67.2	67.9	68.3	65.0	61.4	60.1	58.1	55.1	53.0	51.5	48.4	44.8	75.0
28	19-62	11/18/93	2	V	H		59	48.1	52.4	54.0	52.6	66.3	62.5	60.6	62.6	63.0	65.5	67.8	69.0	70.9	72.2	67.3	67.6	67.2	67.2	65.7	62.4	60.4	57.7	55.0	51.3	79.4
29	19-67	11/18/93	2	OT	V		53	40.1	44.0	49.0	51.3	59.3	59.3	67.2	67.6	64.6	66.5	70.7	71.9	69.8	69.3	66.7	65.5	65.3	64.9	62.6	59.8	58.2	56.3	53.5	51.0	79.3
30	19-74	11/18/93	2	FS			49	41.7	46.8	41.3	55.6	50.8	51.8	54.3	51.8	52.7	59.8	61.2	64.6	69.1	66.6	68.3	64.8	63.1	61.3	59.0	57.7	56.1	53.9	51.1	48.7	75.4
31	19-79	11/18/93	2	T			50	41.1	52.3	41.7	63.1	57.1	65.8	70.0	76.2	67.1	69.8	72.1	69.4	72.2	69.2	67.1	66.9	66.3	63.7	62.4	59.8	58.1	56.6	54.6	50.7	81.6
32	20-53	09/30/92	2	V	H		42*	37.3	39.1	41.7	57.1	50.6	53.8	56.9	55.6	62.2	59.5	65.0	70.7	65.0	66.1	64.7	64.2	62.5	61.1	58.1	54.5	51.5	49.0	47.3	44.2	75.6
33	20-62	09/30/92	2	V	H		45*	44.0	50.0	51.9	52.1	60.4	50.5	56.4	60.6	60.2	69.3	71.4	68.3	66.3	67.7	68.6	66.7	65.3	63.7	61.4	58.5	57.7	54.4	51.8	49.2	78.1
34	20-66	09/30/92	2	F	H	L	40*	38.8	44.1	54.4	45.8	57.7	68.5	61.6	60.3	59.4	61.8	63.9	64.8	68.7	67.8	67.8	66.1	65.6	64.0	60.1	57.3	55.5	52.9	49.2	45.7	77.0
35	21-1	12/08/93	2	T			43	39.3	41.8	42.6	52.0	48.4	57.0	58.7	61.5	57.4	69.5	71.1	61.2	67.0	67.3	67.8	67.7	65.1	66.3	64.6	60.3	56.2	55.5	53.0	47.3	77.9
36	21-2	12/08/93	2	V	H		49	40.4	39.1	55.2	51.0	48.1	50.0	50.4	52.4	53.9	55.6	56.3	60.3	66.0	66.8	66.6	68.6	67.6	64.0	61.9	58.2	54.7	52.3	50.8	47.2	75.4
37	21-3	12/08/93	2	V			58	43.4	42.1	47.4	51.0	51.6	53.2	58.2	56.0	63.8	69.6	62.0	61.8	65.6	68.6	72.3	70.0	67.4	65.0	61.5	59.2	55.8	53.1	51.3	47.2	78.2
38	21-4	12/08/93	2	V			46	42.6	48.8	45.6	47.9	60.8	57.1	57.2	57.3	60.8	65.9	64.9	67.9	68.6	70.1	73.3	71.2	69.7	67.6	65.0	62.2	59.7	57.9	53.8	50.0	79.6
39	21-9	12/08/93	2	G			56	40.4	47.9	50.7	51.9	62.4	55.4	64.8	62.3	64.9	62.0	68.2	63.7	68.6	70.2	71.4	70.5	69.8	69.3	66.3	64.1	61.7	59.9	57.6	53.2	79.6
40	21-12	12/08/93	2	TB			52	40.9	45.7	47.9	48.7	56.4	59.0	59.4	58.7	56.3	61.3	69.0	65.2	63.1	72.1	72.8	70.0	67.5	66.9	65.9	63.1	59.2	55.1	52.0	48.3	79.1
41	21-13	12/08/93	2	D			45	39.5	39.8	50.4	53.6	49.6	65.6	62.4	67.9	63.9	62.5	68.5	66.6	69.2	68.3	68.9	70.0	68.9	65.9	62.4	61.0	58.1	56.3	52.5	47.6	78.8

Figure C-4. Medium Trucks & Buses- Level, Non-Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	21-16	12/08/93	2	V			45	45.8	44.0	52.2	50.0	59.8	54.8	58.5	61.7	64.4	77.0	61.8	65.1	70.3	66.7	66.3	68.4	67.3	64.8	62.1	61.0	59.2	56.5	52.4	49.6	80.0
43	21-18	12/08/93	2	F		L	52	40.3	49.5	43.9	52.0	56.3	63.1	62.2	64.0	66.3	64.3	64.4	64.3	71.0	71.8	72.0	72.1	69.9	70.0	66.5	64.1	63.1	60.3	54.8	49.3	80.4
44	21-23	12/08/93	2	V			47	46.7	44.4	49.7	52.8	53.3	54.7	55.2	58.7	60.9	67.5	69.6	63.1	69.0	73.4	71.1	69.8	68.4	67.4	63.4	60.8	59.1	56.6	53.1	48.5	79.5
45	21-26	12/08/93	2	V	H		52	40.5	42.8	49.1	47.7	56.2	54.9	53.3	56.5	61.6	61.1	62.5	62.3	65.1	67.6	71.0	70.3	68.3	68.7	65.0	62.6	60.1	57.5	58.8	51.4	77.9
46	21-33	12/08/93	2	FS			49	37.9	41.1	43.4	49.0	49.1	56.2	49.6	53.5	56.3	56.7	57.9	62.8	64.0	66.4	72.8	69.2	66.6	63.0	60.6	58.7	55.6	52.1	49.6	44.9	76.8
47	21-34	12/08/93	2	FS			37	38.5	40.6	40.0	47.4	47.4	50.1	44.8	47.0	49.1	51.4	55.2	55.7	62.3	64.3	66.1	67.6	66.0	62.6	60.0	57.2	54.0	52.3	49.9	44.6	73.7
48	21-35	12/08/93	2	T	V		47	40.2	43.9	48.4	61.7	53.0	53.0	66.2	69.8	71.3	76.8	68.0	67.3	71.6	69.6	70.3	69.0	67.1	65.5	64.9	63.2	61.9	56.6	53.4	48.9	81.7
49	21-40	12/08/93	2	TB			51	51.0	46.3	45.5	47.7	65.9	49.3	53.7	58.2	56.5	63.4	58.9	60.6	65.2	65.9	69.6	68.1	65.0	65.9	62.7	60.3	56.4	53.8	50.9	45.8	76.4
50	21-42	12/08/93	2	V			52	38.1	43.7	49.5	51.6	58.0	55.8	65.9	65.7	67.0	63.4	65.1	75.5	68.9	67.6	72.1	69.8	72.7	68.1	64.7	61.9	59.1	56.1	54.4	49.7	81.0
51	21-43	12/08/93	2	TB			51	45.3	41.6	45.2	46.7	67.2	47.8	53.6	59.4	60.3	58.8	56.6	61.6	64.5	66.8	69.9	70.9	67.4	65.9	63.9	59.3	56.6	53.3	50.5	45.6	77.3

Figure C-5. Medium Trucks & Buses - Upgrade, Non-Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	22-3	10/01/92	2	V	V		50*	50.7	44.6	47.6	48.0	49.1	50.1	52.7	55.3	54.0	51.9	58.2	65.8	69.1	68.4	65.8	62.1	62.4	60.8	58.7	55.2	51.9	50.6	51.6	44.6	74.9
2	22-7	10/01/92	2	V	V		49*	39.9	50.5	48.7	65.5	54.3	55.5	54.7	59.9	57.7	54.0	75.1	64.8	65.4	65.9	64.0	61.4	61.1	59.5	56.6	55.1	53.6	50.5	49.2	44.0	77.5
3	22-27	10/01/92	2	D	V		44*	32.9	53.7	55.3	59.5	57.2	68.3	58.6	73.8	69.9	58.2	64.7	68.9	76.3	74.2	72.9	71.5	70.6	69.4	64.0	62.1	58.5	55.7	52.6	48.4	82.6
4	22-33	10/01/92	2	V	H		45*	41.2	44.8	49.4	51.1	54.4	53.7	65.0	58.4	56.4	63.2	62.1	62.3	65.3	68.4	67.0	62.7	61.8	60.1	58.6	54.2	51.0	48.2	46.4	41.8	75.0
5	22-35	10/01/92	2	V	V		45*	41.2	45.8	51.3	53.1	52.8	58.6	58.4	56.5	61.4	60.1	66.8	67.6	65.2	70.1	69.4	67.3	64.4	62.5	59.7	56.8	54.4	51.2	50.2	45.0	76.9
6	22-39	10/01/92	2	V	H		40*	42.8	46.0	52.4	50.4	48.7	53.0	53.2	56.7	57.6	54.3	55.6	62.4	65.8	68.3	67.0	64.8	63.1	60.8	57.4	55.1	53.8	50.3	48.3	43.9	74.4
7	22-43	10/01/92	2	D	H	U	48*	31.7	41.0	50.0	46.2	54.0	51.4	60.7	52.9	54.7	57.6	54.5	70.1	76.4	70.8	66.3	62.8	59.7	59.1	58.1	55.5	53.3	51.5	51.5	47.2	79.0
8	22-52	10/01/92	2	D	V	U	50*	33.3	42.7	45.2	67.4	48.2	52.1	62.6	55.8	60.1	67.9	66.7	68.7	67.0	71.8	69.6	67.1	65.0	63.9	59.2	57.1	56.1	52.5	51.3	45.0	78.4
9	22-55	10/01/92	2	D	V	U	48*	39.3	36.6	45.7	54.3	51.8	57.2	52.5	55.9	57.9	63.1	65.3	65.3	69.2	73.3	68.6	65.0	62.1	62.0	59.2	55.7	52.8	50.0	49.8	43.6	77.5
10	24-5	12/14/93	2	V	H		49	40.4	42.1	45.0	45.1	56.3	55.5	56.2	59.2	61.1	68.0	65.6	63.3	68.9	72.3	71.3	69.2	68.5	66.7	62.9	59.8	57.4	55.3	51.5	47.5	78.9
11	24-11	12/14/93	2	V	H		43	40.9	43.7	48.3	42.1	45.1	53.9	59.7	59.7	66.3	72.3	65.1	65.1	67.8	67.4	68.3	69.0	67.6	67.3	63.7	63.0	64.5	63.0	59.0	55.7	78.9
12	24-13	12/14/93	2	V			45	48.9	66.3	45.0	55.0	55.9	61.2	58.2	71.6	71.1	67.7	73.2	74.9	76.7	77.1	72.8	75.6	70.1	70.2	67.4	68.5	63.6	57.1	55.3	53.6	84.5
13	24-14	12/14/93	2	V			47	38.7	49.7	46.5	51.1	59.0	51.2	61.2	62.2	76.6	60.1	61.4	65.0	65.8	69.5	67.0	64.3	64.3	62.3	59.9	58.0	55.0	55.6	53.6	49.6	79.2
14	24-22	12/14/93	2	D			48	40.6	49.1	62.5	58.9	56.4	64.3	66.7	69.9	72.8	75.7	73.6	74.1	76.1	76.3	76.6	73.5	74.0	75.9	73.3	79.2	76.8	70.6	70.2	66.8	87.2
15	24-25	12/14/93	2	V	H		38	44.9	58.5	46.1	44.7	53.5	50.1	60.1	61.5	63.1	65.6	77.0	64.0	66.7	70.5	66.4	66.2	64.6	61.0	59.1	58.7	56.6	54.1	50.6	49.4	79.7
16	24-32	12/14/93	2	TB			43	46.7	45.2	41.5	46.6	49.8	71.4	73.1	61.0	58.2	59.8	66.0	66.1	64.8	68.1	66.3	66.2	66.3	64.4	60.2	57.9	56.3	53.9	50.6	46.0	78.6
17	24-36	12/14/93	2	V			45	43.6	50.5	47.6	48.5	49.6	53.5	59.5	58.5	61.3	67.2	69.2	65.5	70.0	69.3	67.8	67.7	65.5	66.0	62.6	60.0	57.0	53.3	50.6	47.4	77.9
18	25-1	12/13/93	2	V			45	42.1	43.4	50.7	54.7	63.1	56.1	65.8	64.3	62.5	64.3	63.9	69.4	69.1	69.2	68.9	68.1	67.0	64.0	61.4	58.3	56.3	53.3	52.4	48.6	78.2
19	25-2	12/13/93	2	FS		L	47	44.1	45.4	55.4	61.7	58.3	60.8	64.7	61.8	63.2	61.0	64.7	66.8	66.2	70.0	70.5	66.2	67.5	66.5	64.7	59.6	56.4	53.2	50.9	47.8	78.1
20	25-4	12/13/93	2	T	V		46	39.5	51.1	48.9	52.0	64.0	66.9	66.3	77.6	62.0	68.1	68.3	69.0	68.9	70.4	71.6	70.2	68.7	66.9	63.1	61.5	58.3	55.8	52.2	48.2	81.8
21	25-5	12/13/93	2	FS		L	44	43.8	43.3	49.3	62.4	59.4	65.3	60.6	67.9	64.0	69.2	77.0	70.1	76.5	75.5	72.1	74.4	73.9	71.8	69.7	68.0	67.0	67.8	66.1	61.2	84.5
22	25-7	12/13/93	2	U			55	39.7	39.1	47.2	51.3	58.1	54.7	65.5	64.2	64.1	63.7	67.5	70.6	72.2	75.6	73.6	72.6	71.8	70.2	66.8	63.2	59.6	56.0	53.6	49.9	82.0
23	25-8	12/13/93	2	PU			56	41.1	40.5	41.9	52.9	54.3	52.7	55.3	61.3	59.0	57.5	60.3	67.8	71.5	71.0	73.0	68.4	68.0	66.0	62.1	57.9	55.3	53.0	51.3	46.8	78.9
24	25-9	12/13/93	2	V			54	46.4	45.9	57.0	59.5	62.5	63.5	66.8	67.4	71.9	67.4	72.3	72.0	73.2	71.5	69.3	68.8	68.6	66.5	63.2	61.0	57.6	55.1	53.6	51.8	81.4
25	25-10	12/13/93	2	F		U	49	40.7	45.6	44.1	71.8	57.7	60.7	57.9	60.5	60.3	58.8	61.8	65.8	68.6	68.2	67.8	66.5	66.7	64.7	62.6	60.2	54.2	51.4	49.4	45.3	77.9
26	25-14	12/13/93	2	V			48	40.5	41.3	43.9	49.6	53.9	61.3	63.8	63.1	63.1	62.7	67.4	67.3	65.1	67.1	67.2	65.7	65.9	62.7	59.5	56.7	54.0	51.5	49.2	45.5	76.6
27	25-15	12/13/93	2	V	H		58	39.0	43.5	53.3	46.6	50.1	51.4	55.9	58.6	59.6	59.1	62.9	66.2	71.4	69.8	67.7	65.2	65.3	63.3	62.2	59.5	54.9	54.3	55.3	50.2	77.1
28	25-17	12/13/93	2	D			66	45.1	42.4	53.1	48.3	58.6	58.0	59.6	62.2	62.3	63.1	66.6	68.1	70.8	71.2	71.6	72.6	69.8	69.8	67.7	64.5	65.2	63.2	59.9	55.1	80.5
29	25-19	12/13/93	2	U	H		40	38.3	43.2	41.5	45.2	49.3	63.5	57.2	63.5	61.0	58.3	61.0	65.7	66.8	67.5	65.2	63.9	62.6	63.8	61.1	57.0	53.6	52.7	50.6	49.1	75.5
30	25-20	12/13/93	2	U	H		58	38.8	40.3	46.0	44.0	57.6	61.1	61.8	59.9	59.0	62.0	63.5	68.3	71.8	74.4	70.3	68.6	66.1	64.8	63.8	61.3	57.6	55.9	53.0	49.2	79.5
31	25-22	12/13/93	2	D		L	50	40.6	45.7	51.9	50.1	54.2	54.6	57.4	63.8	74.7	57.8	65.7	70.0	69.8	67.5	68.0	67.1	67.9	63.9	61.9	58.4	55.1	51.9	49.5	45.8	79.3
32	25-26	12/13/93	2	F			51	40.1	39.9	42.0	47.7	51.9	55.0	63.1	58.0	57.1	58.5	60.9	69.2	70.5	68.1	67.1	67.0	65.9	64.4	61.5	61.5	56.3	54.7	52.2	48.5	77.2
33	25-27	12/13/93	2	V	H		52	48.6	50.2	51.1	56.5	55.4	77.8	61.2	63.3	63.3	69.5	67.0	69.7	71.2	70.8	70.6	70.4	69.1	67.5	63.2	60.2	56.2	53.8	51.4	47.5	81.9
34	25-29	12/13/93	2	F		L	52	38.5	42.0	45.2	48.1	50.4	70.6	58.7	63.1	61.6	59.2	63.5	69.4	68.6	72.0	70.7	66.1	67.9	66.6	64.7	65.6	65.0	63.5	60.2	56.8	79.6
35	25-30	12/13/93	2	V	H		54	38.3	44.3	48.1	51.3	58.2	53.9	59.1	62.3	68.1	69.8	65.4	71.6	69.4	66.5	67.3	67.2	66.3	64.4	60.3	58.3	53.9	52.2	50.0	46.2	78.5
36	25-31	12/13/93	2	F			51	41.0	42.0	43.9	47.9	49.7	59.5	53.0	63.3	68.3	58.0	63.4	71.8	67.3	68.4	68.9	67.0	65.6	62.9	61.8	59.6	56.0	53.4	49.3	46.0	77.9
37	25-33	12/13/93	2	TB	H		46	45.7	43.2	53.9	47.8	59.1	67.6	62.8	62.7	62.8	62.8	62.0	68.1	69.3	70.6	71.3	72.1	71.8	68.6	64.0	62.2	61.6	58.3	56.4	52.0	80.1
38	25-34	12/13/93	2	V	H		40	39.1	40.6	54.4	48.0	60.2	53.3	53.2	56.6	58.8	64.7	64.5	72.4	69.3	66.6	66.1	65.8	65.0	63.6	60.6	58.7	56.6	53.4	50.7	48.8	77.5
39	25-36	12/13/93	2	D		L	45	43.1	43.8	45.2	55.1	52.2	63.4	76.0	75.9	71.9	64.3	67.8	67.7	69.5	69.4	68.0	65.6	67.5	65.4	62.2	58.1	54.0	51.6	50.1	47.2	81.8
40	25-37	12/13/93	2	V			50	42.8	48.5	49.3	51.1	62.9	56.8	60.8	59.4	57.0	59.4	66.5	67.4	66.8	68.3	72.6	68.3	66.5	67.6	66.2	63.3	60.3	57.3	54.0	52.3	78.5
41	25-39	12/13/93	2	DV			47	40.8	39.5	43.3	53.0	51.2	55.5	55.9	57.5	70.6	64.0	65.7	67.7	66.6	65.5	65.4	63.6	63.3	61.5	58.7	57.1	54.4	51.9	50.0	46.4	76.5

Figure C-5. Medium Trucks & Buses - Upgrade, Non-Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	25-40	12/13/93	2	V			49	44.3	39.7	47.9	45.2	49.6	51.6	59.1	56.3	55.2	57.3	60.4	67.0	70.1	69.7	67.2	67.5	65.7	64.9	61.3	57.5	54.9	53.6	51.9	47.3	76.9

Figure C-6. Medium Trucks & Buses - Downgrade, Non-Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	26-3	12/20/93	2	V	H		49	43.7	45.2	50.5	49.7	44.5	46.4	53.0	52.6	55.7	55.6	56.7	62.1	66.8	67.1	63.9	62.7	60.3	59.0	56.0	53.6	51.2	48.0	46.0	43.2	73.1
2	26-4	12/20/93	2	V			55	41.7	39.2	52.4	49.1	51.7	50.2	59.0	54.0	54.9	59.7	68.1	63.4	65.5	67.2	66.6	66.2	64.2	62.9	59.1	56.5	54.3	52.1	48.3	44.8	75.5
3	26-12	12/20/93	2	V			53	41.3	43.5	46.1	48.4	50.5	53.1	57.2	58.2	55.5	57.4	69.9	71.7	67.0	67.4	67.9	65.3	64.2	61.7	60.2	59.7	57.7	54.9	52.8	48.1	77.4
4	26-13	12/20/93	2	V			61	43.8	46.2	43.5	48.8	58.4	54.5	57.7	59.7	60.7	57.2	65.0	65.7	68.7	70.5	68.8	69.4	67.6	66.5	63.0	60.4	57.4	54.0	50.8	48.3	77.8
5	26-15	12/20/93	2	V			58	45.0	40.4	45.5	47.0	52.6	54.2	62.5	49.8	57.5	63.7	63.5	66.8	75.4	71.4	72.0	69.4	67.7	65.9	62.0	58.7	56.6	53.5	50.5	47.1	79.9
6	26-18	12/20/93	2	F			62	36.6	45.1	44.4	48.7	56.2	53.5	53.1	59.0	55.5	57.6	58.4	65.5	69.5	69.9	69.3	67.8	67.5	65.3	63.1	61.1	58.2	54.7	51.4	47.8	77.3
7	26-20	12/20/93	2	V			56	42.1	41.0	45.4	51.1	57.2	63.6	55.1	52.9	63.0	63.2	64.9	68.8	70.6	69.5	69.6	70.0	67.1	65.0	62.8	60.2	58.0	55.4	51.1	47.0	78.5
8	26-22	12/20/93	2	D	V		58	42.8	51.3	53.8	59.2	58.7	57.6	59.7	59.0	66.2	65.0	71.3	73.0	71.6	72.9	75.9	71.5	72.7	70.0	71.4	67.9	62.4	61.8	55.7	50.0	82.7
9	26-24	12/20/93	2	D		L	68	37.1	42.1	51.2	58.1	54.6	60.0	57.8	61.4	62.9	67.1	64.7	71.9	72.3	71.1	72.4	71.1	68.6	67.8	63.3	61.4	59.1	56.8	52.3	48.3	80.3
10	26-25	12/20/93	2	V			59	37.8	46.9	46.5	49.1	60.9	54.4	57.1	56.0	57.3	60.6	64.2	65.5	67.2	70.7	72.1	70.7	67.2	65.9	62.7	60.0	58.6	57.0	51.3	47.5	78.4
11	26-27	12/20/93	2	V			57	42.1	52.8	45.1	48.1	52.2	53.4	54.0	56.8	58.2	58.7	65.5	64.6	69.1	69.3	67.7	66.2	64.3	61.9	59.3	56.5	54.6	51.7	48.4	46.7	76.3
12	26-30	12/20/93	2	U			59	40.1	46.0	41.9	47.1	54.7	60.6	55.8	59.6	56.9	58.3	61.5	69.0	69.4	67.3	65.8	64.9	62.7	60.8	58.8	56.8	54.8	53.0	51.1	48.3	76.0
13	28-2	12/06/93	2	V	H		57	41.2	46.5	52.9	55.0	55.4	58.8	68.6	68.1	65.8	65.7	68.3	71.7	73.0	69.0	66.7	65.3	62.5	61.1	59.3	56.3	54.7	51.8	49.3	45.3	79.3
14	28-3	12/06/93	2	V	H		53	42.6	47.6	46.4	45.9	52.0	54.7	56.8	59.4	59.0	69.8	67.1	66.3	66.5	69.9	65.9	63.1	60.0	57.5	56.9	53.7	51.8	48.8	45.9	43.5	76.5
15	28-5	12/06/93	2	V	H		41	42.4	43.6	45.4	47.9	46.1	49.5	54.5	54.9	56.6	52.5	52.8	57.7	59.8	60.6	62.4	64.0	60.1	57.3	54.0	52.2	51.8	50.4	44.6	42.5	70.4
16	28-7	12/06/93	2	V	H		58	44.6	42.9	46.8	59.0	53.0	57.2	63.5	59.5	64.5	66.4	71.2	74.6	71.0	68.7	68.3	67.1	65.7	63.1	61.5	58.3	54.3	50.8	48.6	45.2	79.8
17	28-14	12/06/93	2	V	H		62	39.5	53.3	44.1	48.9	52.3	50.8	61.0	59.4	66.0	63.2	71.7	70.4	70.9	73.7	69.5	67.6	64.8	63.3	61.4	58.2	56.2	54.1	50.6	46.3	79.7
18	28-18	12/06/93	2	D	V		44	37.7	41.4	45.4	50.4	48.5	53.2	64.3	62.1	69.6	70.8	66.6	66.3	65.3	62.5	62.3	60.7	59.3	57.8	57.7	55.7	51.5	48.3	46.1	43.1	76.6
19	28-23	12/06/93	2	V	H		56	40.2	45.4	50.9	46.5	51.1	54.7	66.1	66.0	61.4	62.9	72.3	74.6	67.6	65.8	64.1	63.3	63.1	61.3	60.3	58.1	55.0	51.8	48.1	44.3	78.9
20	28-25	12/06/93	2	F	H	U	59	40.2	46.4	51.7	53.9	51.8	56.9	63.6	60.7	64.2	71.1	72.2	71.2	72.0	72.6	72.8	70.4	67.5	65.4	63.5	60.2	57.4	54.2	51.5	47.3	81.0
21	28-26	12/06/93	2	TR	V		52	39.4	43.6	43.3	50.1	49.5	61.2	56.9	62.2	61.1	63.5	73.3	71.4	70.1	69.1	66.0	65.0	63.6	60.2	57.1	54.3	51.2	48.6	45.6	42.6	78.6
22	28-31	12/06/93	2	V	H		56	43.8	44.9	41.2	50.7	50.5	51.2	59.1	56.6	60.2	65.5	67.4	69.0	67.4	69.2	72.5	70.7	67.6	64.8	63.1	59.9	56.3	53.6	50.4	47.6	78.8
23	28-32	12/06/93	2	TB	H		48	47.5	39.9	42.1	48.4	50.8	59.5	56.4	57.7	73.6	61.4	64.7	67.8	67.5	68.2	67.4	64.8	64.5	62.9	59.9	59.3	55.9	52.2	49.9	46.8	78.0
24	28-33	12/06/93	2	V	H		50	45.0	53.2	46.6	49.7	54.0	56.6	60.3	60.0	76.1	67.0	66.4	69.2	67.4	66.4	64.8	63.5	62.5	61.6	59.1	56.3	52.4	49.3	46.8	44.0	79.1
25	28-34	12/06/93	2	V	H		55	40.8	46.0	43.2	47.8	52.4	53.2	56.3	57.5	62.2	69.6	69.5	70.0	73.9	70.8	69.8	68.0	65.3	62.9	61.2	59.0	56.2	54.7	51.5	47.4	79.6
26	28-35	12/06/93	2	V	H		49	40.2	40.2	49.9	44.3	49.8	48.3	51.8	54.7	58.3	62.5	67.9	69.2	66.1	64.4	62.6	61.2	58.9	57.9	57.3	54.9	51.5	49.5	47.6	44.8	74.8
27	28-50	12/06/93	2	F	H		44	36.5	39.3	43.4	54.0	54.6	49.0	59.5	61.5	71.7	69.0	65.0	64.8	65.0	66.3	65.5	64.2	63.1	61.4	60.4	59.1	56.9	53.2	52.3	47.1	77.1
28	29-3	11/30/93	2	V	H		40	48.5	38.6	43.1	45.0	46.4	49.3	53.3	55.7	55.0	52.2	58.1	59.4	58.2	57.8	58.3	58.5	55.2	53.7	51.5	48.7	46.6	43.5	42.1	41.1	68.1
29	29-17	11/30/93	2	V	H		30	39.2	39.6	60.8	47.0	57.1	57.9	56.5	62.0	71.9	65.2	61.9	59.9	60.0	59.8	59.0	57.0	61.1	53.4	50.8	53.3	46.4	44.8	41.6	40.5	74.9
30	29-18	11/30/93	2	W			43	40.0	45.5	45.7	56.8	56.0	53.5	53.9	57.2	63.8	55.4	57.3	65.6	66.3	62.5	63.3	60.7	59.3	56.5	55.2	54.2	51.4	48.3	45.3	43.2	73.1
31	29-21	11/30/93	2	TB			36	38.7	41.7	43.0	46.0	54.3	49.0	53.4	58.8	53.1	65.9	71.9	60.6	64.0	65.5	60.4	60.7	58.6	57.2	53.9	51.9	49.9	47.4	43.9	41.6	75.1
32	29-24	11/30/93	2	T	V		40	36.5	41.8	51.0	47.4	57.2	54.2	53.1	57.1	55.6	62.0	59.5	60.4	65.4	60.5	62.0	62.7	65.9	60.2	58.1	55.5	53.2	51.2	47.2	45.0	73.0
33	29-36	11/30/93	2	V	H		33	42.2	43.4	50.3	50.2	53.8	52.1	54.9	53.5	60.2	67.4	59.3	59.8	59.5	59.5	58.7	61.2	58.5	57.5	55.2	52.6	50.5	48.4	44.1	42.1	71.9
34	29-40	11/30/93	2	TB			41	39.7	39.7	42.8	49.9	52.8	51.4	54.0	55.2	55.6	67.9	56.8	60.8	62.2	61.8	61.1	61.4	58.5	57.8	55.9	52.6	51.2	48.3	45.4	43.6	72.4
35	30-8	12/02/93	2	V	H		49	46.9	48.2	57.8	59.7	57.8	59.1	62.8	62.8	61.4	63.0	63.5	71.4	70.8	69.7	69.0	68.8	68.2	66.3	65.0	62.8	60.3	58.8	55.0	50.0	79.1
36	30-14	12/02/93	2	V	H		39	41.5	42.8	52.7	55.5	54.2	56.3	66.9	66.9	73.4	61.1	60.3	63.3	63.2	63.0	63.8	65.2	62.1	57.8	55.1	53.2	50.7	48.1	46.2	43.2	77.0
37	30-15	12/02/93	2	F	V	L	44	38.8	42.8	45.4	49.7	51.8	51.5	55.1	57.8	56.1	58.9	66.5	67.2	65.7	67.8	64.6	65.0	63.8	60.5	59.4	55.8	53.2	50.4	49.7	44.5	75.2
38	30-39	12/02/93	2	D	H	L	48	43.5	46.0	53.6	52.6	56.9	61.8	65.2	62.2	62.4	67.2	66.6	66.9	71.4	73.5	70.6	68.2	66.9	67.1	64.0	61.9	59.7	57.1	54.1	50.0	79.7
39	30-43	12/02/93	2	V	H		45	41.7	43.7	46.8	52.2	58.3	58.1	61.3	59.9	62.9	65.1	61.4	65.8	64.2	65.2	67.5	65.5	64.4	61.8	59.9	58.9	53.7	51.7	49.0	45.3	75.6

Figure C-7. Heavy Trucks - Level, Controlled Access Roadways

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	1-1	10/07/92	3-2	V	V		47*	41.2	41.3	49.1	61.9	54.7	58.7	59.4	59.0	61.6	66.6	76.2	70.2	72.2	74.8	73.0	74.0	70.8	68.3	66.1	66.5	61.8	60.9	57.5	54.3	82.7
2	1-2	10/07/92	3-2	V	V		48*	35.7	44.0	47.6	65.3	58.0	61.1	63.9	63.6	62.0	64.2	70.2	75.8	72.0	74.4	76.0	74.9	73.6	71.3	69.8	68.6	66.7	65.0	61.4	56.5	83.8
3	1-3	10/07/92	3-2	V	V		44*	49.6	39.7	52.2	52.3	70.4	63.2	57.8	62.9	65.6	65.5	66.9	70.8	70.3	74.6	74.0	74.7	72.4	70.9	67.2	64.2	60.7	59.0	56.4	50.8	82.4
4	1-4	10/07/92	3-2	V	V		45*	40.7	43.7	46.0	67.1	54.1	60.6	63.0	63.9	70.1	71.2	72.6	73.5	74.5	76.4	76.1	74.6	72.1	70.0	67.7	65.2	62.1	58.6	56.0	49.3	84.0
5	1-5	10/07/92	3-2	V	V		42*	37.4	41.9	53.9	47.5	56.3	57.3	54.5	56.9	55.3	65.4	74.9	63.1	69.6	75.9	74.2	75.4	72.0	69.2	66.6	63.7	60.1	58.2	55.7	48.9	82.6
6	1-8	10/07/92	3-2	V	V		37*	44.5	37.2	57.1	55.1	52.5	54.6	54.9	57.4	61.2	60.1	75.8	65.4	71.4	76.6	72.8	71.8	69.9	66.6	62.6	59.8	57.0	55.2	54.0	50.0	82.0
7	1-11	10/07/92	3-2	T	V		42*	39.6	39.9	54.7	55.2	55.4	54.4	56.3	59.9	65.9	56.8	76.9	65.9	69.3	77.3	72.5	72.7	70.4	68.1	65.6	63.9	62.6	60.0	57.3	50.1	82.7
8	1-12	10/07/92	3-2	V	V		45*	41.8	46.3	56.6	51.6	56.3	66.2	68.9	67.4	68.8	66.3	69.5	70.3	73.8	74.8	72.7	71.7	70.5	69.6	66.7	65.4	63.1	60.5	57.0	50.0	82.3
9	1-15	10/07/92	3-2	V	V		44*	46.3	64.3	53.4	52.0	53.2	58.1	62.6	60.5	61.5	64.0	68.2	72.5	75.0	75.6	74.0	73.3	71.3	68.0	66.0	66.6	64.4	60.3	57.5	52.9	82.6
10	1-16	10/07/92	3-2	V	V		44*	39.8	48.3	45.3	53.7	54.1	54.5	59.1	61.1	61.7	69.2	68.5	68.0	74.6	74.7	72.5	72.3	71.7	68.7	66.2	61.6	59.3	56.2	54.4	46.2	81.7
11	1-18	10/07/92	3-2	V	V		46*	44.6	45.7	64.0	54.3	54.9	58.9	59.9	56.4	67.8	70.4	73.5	66.9	69.9	74.5	72.6	71.6	70.9	68.8	66.4	65.0	62.7	59.4	56.6	50.8	81.8
12	1-19	10/07/92	3-2	V	V		40*	34.5	41.5	61.6	51.4	52.7	63.5	56.4	58.9	65.2	67.4	66.5	69.0	72.0	72.0	73.6	74.2	71.9	67.7	65.9	62.8	59.3	57.0	57.4	48.0	81.3
13	1-20	10/07/92	3-2	F	V	U	43*	35.6	51.4	65.8	50.3	62.0	65.0	61.1	58.1	64.7	60.5	71.0	69.1	73.1	74.1	72.2	70.7	69.2	67.6	65.9	66.4	63.9	60.9	57.2	53.7	81.4
14	1-21	10/07/92	3-2	V	V		44*	38.9	48.2	59.6	50.0	53.9	56.1	55.9	56.4	65.4	62.5	77.9	67.8	71.2	75.0	72.3	70.7	69.5	67.5	64.6	62.6	61.4	59.5	57.5	50.0	82.3
15	1-22	10/07/92	3-2	T	V		49*	34.1	45.3	44.6	64.7	51.2	54.4	58.4	58.4	62.4	72.9	75.9	72.6	70.4	74.8	76.0	73.8	71.5	69.0	67.0	65.1	62.4	59.5	59.2	52.4	83.5
16	1-25	10/07/92	3-2	V	V		47*	40.9	45.3	59.6	52.2	56.3	59.3	61.6	56.4	62.4	61.9	66.9	67.4	73.3	77.8	75.1	74.2	72.7	71.2	69.8	68.3	66.7	63.9	59.9	50.7	83.3
17	1-26	10/07/92	3-2	V	V		46*	41.9	46.1	64.8	56.3	56.6	58.3	59.1	59.8	65.3	62.8	68.5	68.1	71.7	76.4	72.3	72.0	70.4	67.2	64.8	61.7	57.5	56.2	54.9	49.3	81.4
18	1-28	10/07/92	3	D	H		55*	37.3	41.2	54.9	62.4	53.1	54.6	56.8	62.8	61.5	63.4	73.2	64.5	69.8	73.5	85.6	72.8	69.8	69.4	65.0	63.5	59.2	56.3	55.4	51.3	86.7
19	1-29	10/07/92	3-2	V	V		46*	44.6	47.1	63.7	52.9	54.8	56.9	59.9	59.7	66.3	65.0	72.5	70.2	70.9	74.1	75.4	71.4	69.7	67.9	65.4	62.5	59.4	58.2	56.5	47.8	81.8
20	1-30	10/07/92	3-2	V	V		42*	32.7	35.3	57.2	53.6	54.0	57.0	61.1	63.1	60.5	69.0	70.0	68.0	72.3	71.8	73.0	71.1	68.5	65.9	63.7	61.2	58.8	56.2	54.1	48.3	80.5
21	1-31	10/07/92	3-2	V	V		44*	43.0	44.4	50.3	48.6	51.5	53.0	53.7	61.5	60.4	63.1	74.5	65.5	69.5	77.1	72.2	70.4	68.4	65.5	62.2	59.3	57.7	56.1	52.8	45.9	81.5
22	1-32	10/07/92	3-2	V	V		44*	32.7	48.2	60.2	56.2	57.2	65.0	54.8	63.3	63.0	64.4	69.0	64.6	71.5	75.7	71.9	71.6	70.0	68.5	67.4	65.5	61.6	56.0	54.5	50.4	81.2
23	1-35	10/07/92	3-2	V	V		43*	42.8	42.8	53.3	51.5	53.7	54.4	54.7	55.9	59.2	58.7	72.0	65.5	66.7	75.4	72.2	71.4	67.8	64.2	62.5	60.0	57.9	54.3	52.8	44.6	80.2
24	1-36	10/07/92	3-2	V	V		44*	32.4	42.9	66.4	56.4	59.5	56.3	61.8	59.6	67.0	59.9	71.6	65.7	68.2	76.8	74.7	73.7	69.8	67.1	64.6	62.5	61.4	58.8	56.5	51.8	82.1
25	1-37	10/07/92	3-2	V	V		47*	35.4	45.1	52.0	53.2	56.9	57.0	58.0	55.7	59.1	63.3	75.2	73.1	69.8	77.2	72.6	70.9	68.8	67.4	65.4	63.6	60.2	57.1	55.6	46.6	82.3
26	1-39	10/07/92	3-2	V	V		43*	42.7	45.8	58.3	62.6	65.9	62.9	66.5	59.4	57.7	60.2	61.5	68.7	71.4	73.7	75.5	73.5	73.2	70.8	66.3	63.1	60.2	58.3	55.7	49.9	82.1
27	1-41	10/13/92	3-2	V	V		48*	37.5	43.8	64.4	56.8	59.7	59.0	59.2	65.1	61.2	65.9	67.0	72.9	71.2	74.6	78.4	73.6	72.1	70.2	67.4	63.9	60.5	57.5	56.3	49.4	83.2
28	1-45	10/13/92	3	D	V	U	42*	40.8	45.3	50.4	61.9	58.7	59.3	57.4	63.3	65.9	67.7	66.7	73.7	72.5	72.8	73.1	72.5	71.1	67.3	65.1	65.1	60.8	57.9	55.7	51.3	81.6
29	1-46	10/13/92	4	G	V		40*	43.1	51.6	61.5	55.9	58.2	60.7	59.9	63.8	67.7	70.0	64.7	77.2	71.2	73.0	77.9	74.3	72.4	71.2	67.4	64.4	62.2	59.0	56.4	50.7	83.8
30	1-50	10/13/92	3-2	V	V		57*	45.4	47.7	66.2	54.0	59.7	64.3	61.5	62.9	68.1	63.7	83.1	72.5	68.6	74.1	73.3	72.1	70.1	67.2	65.6	64.9	62.4	60.1	57.3	50.9	85.3
31	1-55	10/13/92	3-2	V	V		45*	44.8	43.1	58.5	53.7	53.6	64.8	59.9	63.5	68.6	62.3	67.3	70.2	74.0	72.4	70.7	70.2	70.4	66.8	64.6	61.9	57.6	54.8	52.9	44.9	80.7
32	1-62	10/13/92	3-2	T	V		45*	38.8	46.5	60.7	60.8	61.9	63.9	64.3	65.4	64.0	65.2	64.4	67.4	73.2	75.8	74.5	72.6	71.7	69.9	66.9	63.8	61.6	60.9	58.1	50.6	82.2
33	1-64	10/13/92	3-2	V	V		49*	36.3	41.7	59.0	52.3	57.4	66.2	66.4	70.8	73.1	70.5	75.5	68.3	74.7	79.3	74.5	73.7	71.5	68.3	66.2	63.7	60.8	58.0	55.5	50.1	84.6
34	1-65	10/13/92	3-2	F	V		45*	36.2	38.4	57.7	50.5	53.4	60.6	52.7	58.8	57.8	65.2	75.9	66.7	69.0	76.2	73.7	73.6	70.4	68.6	63.6	61.1	58.1	55.5	53.9	46.8	82.3
35	1-66	10/13/92	3-2	V	V		42*	44.9	46.1	61.5	53.2	56.9	59.5	59.4	61.3	68.4	63.1	72.4	69.1	71.2	73.3	73.6	73.3	71.6	66.6	65.5	64.7	63.5	57.0	54.0	48.7	81.7
36	1-67	10/13/92	3-2	V	V		48*	45.8	49.0	50.9	63.0	55.9	60.5	68.0	63.1	65.4	68.7	74.9	70.4	72.4	74.8	74.4	74.1	72.9	68.7	68.6	67.0	65.5	58.2	54.6	48.8	83.2
37	1-68	10/13/92	3-2	D	V		49*	50.0	47.6	53.5	63.9	57.9	59.9	64.5	62.4	69.0	69.8	67.0	72.0	77.8	74.9	75.5	74.8	73.1	72.0	66.9	66.1	63.2	60.0	56.0	51.1	84.0
38	2A-1	09/14/92	3	D	V		53*	34.6	49.2	47.3	52.0	55.5	55.6	57.6	57.8	61.3	71.5	67.2	70.7	69.9	71.3	70.1	70.8	69.1	68.2	65.6	63.0	60.9	57.6	54.9	50.1	80.1
39	2A-2	09/14/92	3-2	V	V		51*	47.0	43.2	59.1	56.5	54.8	55.8	60.1	57.4	69.3	72.9	77.5	70.7	68.9	71.7	71.0	73.2	70.8	69.0	68.6	67.3	65.6	57.7	53.9	48.2	82.8
40	2A-5	09/14/92	2-2	V	V		51*	40.7	39.9	49.7	50.0	58.3	60.2	59.3	59.3	80.3	73.5	66.8	72.8	75.1	76.5	76.7	70.4	68.9	67.2	63.9	61.7	58.8	55.6	53.6	49.6	84.9
41	2A-6	09/14/92	3-2	V	V		51*	43.8	43.1	59.8	56.6	58.1	56.1	61.0	63.9	62.6	64.3	68.8	70.8	70.0	70.8	69.7	71.3	72.0	67.8	64.9	64.3	61.0	57.5	57.0	50.5	80.2

Figure C-7. Heavy Trucks - Level, Controlled Access Roadways

(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAXA
42	2A-7	09/14/92	3-2	V	V		55*	37.8	48.6	71.6	53.0	58.9	65.7	64.9	66.1	75.2	76.5	78.5	75.2	72.7	75.7	75.6	77.0	76.8	73.8	73.4	72.6	67.7	67.0	59.9	52.6	86.8
43	2A-9	09/14/92	3-2	V	V		51*	41.6	46.8	57.1	53.2	55.5	55.7	56.5	58.9	60.4	65.5	76.4	77.3	70.7	74.3	73.7	71.8	71.3	68.9	70.4	68.6	60.5	57.1	54.2	49.2	83.5
44	2A-12	09/14/92	3-2	V	V		47*	41.5	38.1	63.3	54.7	49.8	57.6	56.8	61.7	57.9	60.8	67.0	68.5	67.4	70.3	73.6	70.7	70.2	67.7	68.1	63.5	60.2	58.3	56.1	55.5	79.9
45	2A-17	09/16/92	3-2	V	V		57*	52.8	49.5	61.4	63.3	67.4	62.8	65.7	64.2	69.6	68.0	77.3	72.8	72.5	80.4	75.1	77.3	75.2	71.3	68.9	66.7	64.3	61.8	58.3	53.8	85.8
46	2A-22	09/16/92	3-2	CC	H	L	55*	36.6	45.5	67.5	56.0	54.5	67.8	62.2	65.1	66.1	65.9	68.9	73.8	74.4	72.3	75.9	75.4	73.7	72.1	72.0	70.0	67.6	65.5	61.7	56.9	84.0
47	2A-23	09/16/92	3-2	V	V		48*	47.2	48.0	56.8	53.3	62.0	64.7	60.7	58.8	64.8	66.1	75.1	71.8	68.6	71.6	71.8	72.4	70.8	68.6	65.2	63.7	61.3	58.4	55.4	51.1	81.6
48	2A-24	09/16/92	3-2	V	V		50*	42.8	47.7	56.0	56.1	53.4	54.7	53.3	57.8	62.1	68.2	74.7	64.9	67.0	71.1	69.5	68.9	67.5	65.6	62.1	59.9	57.6	54.6	53.6	48.4	79.6
49	2A-25	09/16/92	3-2	V	V		48*	32.1	40.1	44.9	60.5	51.9	53.2	61.9	55.3	59.3	57.5	63.4	67.4	68.3	71.4	73.1	70.5	68.6	64.7	63.9	61.8	58.2	54.1	52.4	48.6	79.1
50	2A-30	09/16/92	3-2	V	V		47*	39.0	42.8	52.1	60.7	56.6	63.7	66.4	65.9	68.5	69.3	78.2	70.1	68.9	73.8	72.7	72.4	71.3	68.2	65.5	63.0	60.8	58.9	57.9	53.5	83.0
51	2A-31	09/16/92	3-2	V	V		50*	40.0	42.7	52.6	57.7	56.6	61.1	64.8	61.2	65.2	66.5	75.9	69.3	67.7	73.5	71.8	72.0	72.0	67.0	67.1	63.4	60.1	59.6	57.2	61.5	81.9
52	2A-32	09/16/92	3-2	V	V		48*	42.0	43.9	63.0	56.5	55.7	57.5	55.9	56.9	59.8	64.9	76.8	68.0	68.4	72.5	71.4	71.4	68.5	67.5	67.5	65.4	63.8	56.9	53.4	52.3	81.5
53	2A-33	09/16/92	3-2	V	V		50*	44.4	46.4	62.0	56.3	56.0	58.9	60.0	66.4	63.6	63.6	76.1	66.9	66.6	74.8	69.8	71.4	69.7	66.5	64.7	62.3	59.3	56.6	55.2	49.3	81.4
54	2A-36	09/16/92	3-2	V	V		48*	45.4	40.5	40.4	59.8	54.8	52.1	59.1	58.4	60.9	59.3	61.6	66.4	67.2	69.7	70.7	69.3	67.8	65.7	64.1	60.9	58.9	57.2	54.8	47.9	77.9
55	2A-37	09/16/92	3-2	D	V		49*	44.4	47.8	53.6	54.0	57.2	57.3	69.4	71.9	73.9	63.8	72.3	64.7	68.3	70.6	69.4	69.5	68.6	68.4	66.1	63.6	60.8	59.1	55.7	51.0	81.2
56	2A-41	09/16/92	4	D	V		54*	32.3	36.7	46.4	54.4	64.7	55.2	67.6	64.0	62.4	67.1	72.6	67.6	71.1	74.3	73.8	81.5	73.0	72.4	71.3	68.1	66.9	62.9	60.5	55.6	85.0
57	2A-43	09/16/92	3	V	H		45*	34.4	45.5	47.6	51.6	83.1	57.1	59.3	75.3	77.1	70.5	68.6	70.8	68.6	69.8	70.9	70.8	68.3	65.5	64.2	62.3	59.4	57.3	55.3	52.2	85.8
58	2A-45	09/16/92	3-2	V	V		55*	42.8	45.3	65.6	53.7	58.1	65.9	72.6	76.8	74.0	71.0	77.8	73.4	72.6	75.7	73.7	76.8	73.6	68.5	67.8	64.5	61.7	56.2	54.4	47.1	85.6
59	2A-47	09/16/92	3-2	V	V		49*	42.9	45.3	49.2	61.9	52.2	58.0	60.7	60.8	69.4	64.7	75.3	72.6	71.4	71.3	71.8	72.0	70.3	67.2	64.3	61.9	58.5	57.9	55.8	55.9	81.7
60	2A-51	09/16/92	2-2	V	V		50*	47.1	46.7	49.9	59.9	56.5	62.3	60.6	61.0	64.5	65.1	68.4	67.3	65.6	68.9	72.1	70.4	69.5	68.4	67.0	65.5	62.3	60.5	59.3	59.2	79.6
61	2A-52	09/16/92	3	D	V		41*	33.2	49.5	45.2	48.0	47.4	51.0	52.9	58.7	69.2	66.3	63.9	67.0	68.4	70.8	70.8	70.1	69.9	66.8	64.9	63.3	59.9	58.3	55.9	52.1	79.3
62	2A-53	09/16/92	3-2	D	V		46*	38.7	39.8	48.5	73.5	57.8	63.3	72.4	65.4	69.2	69.8	75.1	72.9	74.6	77.8	75.4	74.8	75.4	71.8	69.3	67.9	63.8	61.1	58.3	54.5	85.3
63	2A-57	09/16/92	3	F	V		46*	35.8	43.9	50.8	46.6	61.1	68.6	58.0	61.9	67.6	66.2	63.7	63.4	66.8	70.5	71.4	69.6	69.0	67.3	65.0	60.7	59.0	59.3	57.0	51.3	79.2
64	2A-58	09/16/92	3-2	V	V		51*	44.7	43.0	48.9	60.2	64.3	59.0	61.1	61.3	65.1	69.6	75.2	73.2	68.4	73.1	74.2	74.1	72.0	70.2	67.3	65.3	63.5	60.4	59.3	54.5	82.8
65	2A-62	08/24/94	3-2	V	V		51	44.5	45.2	56.3	53.1	57.2	61.2	67.7	71.5	70.8	71.6	72.5	71.3	69.4	74.3	74.4	71.8	72.1	68.5	65.7	63.0	61.1	60.1	57.8	50.0	82.8
66	2A-63	08/24/94	3-2	V	V		52	38.9	44.0	60.8	56.4	57.5	57.0	59.1	60.9	63.3	64.8	77.8	67.9	66.7	75.3	71.8	71.8	70.6	68.3	65.7	62.8	60.6	59.7	57.0	46.9	82.4
67	2A-65	08/24/94	3-2	V	V		47	36.5	45.7	62.0	54.4	53.0	62.7	57.8	61.4	62.8	73.7	79.9	66.3	70.3	74.5	70.0	70.9	71.0	67.0	65.4	63.6	61.9	59.3	58.9	53.8	83.5
68	2A-66	08/24/94	3-2	V	V		45	50.8	44.8	54.0	52.4	55.5	56.9	56.3	57.1	63.3	72.3	68.9	64.7	67.4	70.4	70.8	68.3	68.9	66.3	63.4	59.0	56.9	54.2	56.0	46.1	79.2
69	2A-68	08/24/94	3	G			48	38.5	39.8	54.7	62.8	57.0	55.7	62.1	59.3	64.5	72.8	79.8	67.6	68.2	73.4	70.5	72.0	70.8	69.2	66.3	65.0	64.7	62.1	60.7	56.0	83.4
70	2A-70	08/24/94	3-2	T	V		53	36.3	42.5	64.5	56.7	56.4	56.1	63.6	62.3	65.7	69.2	64.3	65.2	73.2	69.0	71.9	68.9	66.8	64.9	63.0	61.3	60.2	58.4	58.4	48.7	79.6
71	2A-71	08/24/94	3-2	D	V		52	41.9	42.0	51.2	59.5	57.1	59.7	61.9	64.1	69.5	71.4	81.0	69.3	70.6	73.8	72.6	71.8	73.3	68.9	66.0	64.2	62.3	60.6	60.3	53.6	84.3
72	2A-72	08/24/94	3-2	D	V		46	37.4	43.2	48.9	66.5	58.5	57.7	68.1	62.8	69.3	73.4	78.5	75.0	75.4	76.2	77.4	75.9	77.3	76.6	76.1	74.7	72.4	68.5	65.6	59.4	87.1
73	2A-73	08/24/94	3-2	V	V		48	47.0	50.6	61.4	61.1	58.4	61.0	61.0	63.3	62.7	67.3	77.3	66.3	67.1	71.8	72.7	68.2	68.6	65.9	62.7	59.5	57.9	56.9	57.5	47.6	81.3
74	2A-74	08/24/94	3	D	V		41	52.7	37.3	60.1	58.2	56.8	63.9	57.5	62.0	70.6	66.0	65.6	63.5	68.3	73.0	72.8	71.5	68.6	67.8	64.7	61.9	59.1	55.9	57.6	49.9	80.3
75	2A-75	08/24/94	2-2	V	V		52	46.9	48.6	51.2	61.1	56.9	57.4	59.0	61.2	61.4	63.8	75.3	76.8	68.5	71.4	73.0	72.7	70.5	68.7	66.7	65.3	63.3	60.0	58.1	53.1	82.6
76	2A-76	08/24/94	3-2	D	V		51	43.1	44.0	48.1	62.4	55.8	59.0	64.7	69.2	70.8	74.4	79.5	70.8	71.3	75.6	75.2	74.9	73.3	71.1	68.6	66.7	63.8	60.3	59.8	54.2	85.0
77	2A-79	08/24/94	2-1	V			52	45.4	47.2	58.8	54.2	54.2	59.7	60.1	60.3	63.6	64.2	64.7	68.1	74.6	70.3	70.6	70.8	68.8	66.0	63.4	62.0	59.8	58.1	59.3	51.9	80.0
78	2A-80	08/24/94	3-2	V			47	41.0	43.7	57.3	54.3	55.1	54.5	60.1	61.1	71.1	72.9	64.4	68.7	72.9	71.9	70.2	70.5	68.5	66.5	66.9	64.3	59.4	56.1	57.3	48.4	80.9
79	2A-81	08/24/94	3	DV		U	48	39.5	42.8	51.3	47.8	66.4	60.5	65.0	64.3	66.6	76.9	68.2	66.0	69.6	71.9	73.9	77.2	73.0	71.5	69.3	63.8	59.9	57.6	58.1	49.0	83.5
80	2A-82	08/24/94	3-2	V	V		47	37.9	39.1	54.3	58.5	57.7	65.4	59.7	64.4	64.5	73.8	75.1	64.5	69.4	72.4	72.0	71.8	70.0	67.2	63.9	61.3	58.7	56.9	56.0	49.1	81.7

Figure C-7. Heavy Trucks - Level, Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAXA
81	2A-83	08/24/94	4	D	V		49	36.9	45.1	46.3	63.5	56.3	57.3	63.3	65.5	63.9	66.2	81.5	68.8	68.9	76.0	72.3	75.6	71.1	68.2	66.4	64.3	61.5	58.0	59.0	52.1	84.7
82	2A-84	08/24/94	2-2	V	V		52	42.9	39.2	53.2	57.5	52.2	55.4	58.8	58.3	63.8	67.4	68.7	66.2	65.8	69.6	69.2	68.7	68.3	66.0	64.3	62.2	59.1	56.1	58.5	52.6	78.3
83	2A-85	08/24/94	3-2	V	V		51	42.1	40.5	58.5	59.0	59.3	60.6	67.2	66.7	77.3	65.2	70.3	68.2	70.1	72.6	72.0	72.3	70.2	64.7	63.6	60.5	58.7	57.0	57.6	50.2	82.3
84	3-1	10/21/92	3	D	V	L	53*	34.3	39.6	50.7	60.6	55.0	56.9	63.2	65.0	69.9	71.1	70.7	74.0	72.7	72.9	71.0	71.1	71.3	69.2	65.1	63.1	61.0	61.2	58.6	54.0	82.1
85	3-5	10/21/92	3-2	F	V	L	49*	38.0	43.6	58.5	67.0	54.5	62.1	62.5	68.1	69.8	73.0	76.8	76.3	74.7	74.5	72.0	72.6	69.4	67.0	65.1	65.5	64.5	60.3	56.3	52.2	84.0
86	3-9	10/21/92	3	D	V	U	53*	48.9	52.3	53.3	63.2	57.7	61.4	60.7	58.9	66.0	72.3	74.6	71.4	71.5	71.9	70.9	70.7	69.3	67.8	64.7	61.2	58.7	56.8	54.7	50.8	81.6
87	3-11	10/21/92	3-2	V	V		54*	46.8	48.7	55.4	68.1	57.1	61.3	65.1	62.1	68.1	73.0	80.4	76.4	75.2	77.8	76.1	75.4	74.1	71.3	67.9	66.0	64.2	62.2	61.1	55.6	86.2
88	3-13	10/21/92	3-2	V	V		49*	43.5	45.3	47.9	59.8	56.4	58.8	63.8	62.3	73.4	68.8	69.3	70.8	71.8	73.3	73.1	71.5	68.8	65.6	63.3	60.8	58.4	55.1	51.4	47.5	81.6
89	3-14	10/21/92	3	D	V		41*	41.5	44.9	67.7	55.7	60.1	70.0	61.7	66.7	66.0	67.3	69.1	67.0	68.2	68.6	71.0	68.3	68.4	64.8	63.0	60.2	56.3	53.1	51.8	45.3	79.7
90	3-18	10/21/92	3-2	V	V		46*	41.4	46.6	58.8	53.6	60.4	59.7	65.9	65.0	70.8	71.4	76.7	75.5	75.6	76.1	71.9	71.8	72.7	73.0	67.8	67.9	61.1	58.3	55.0	49.1	84.5
91	3-20	10/21/92	3-2	V	V		44*	43.2	43.5	53.2	53.3	53.6	59.1	63.2	66.6	64.2	70.0	71.7	72.2	72.3	74.0	72.6	69.4	68.0	64.9	61.6	58.0	54.3	51.6	50.4	44.1	81.2
92	3-24	10/21/92	4	T	V		45*	41.5	43.1	57.7	61.4	55.0	58.6	60.4	71.2	72.1	74.3	74.9	70.2	72.8	72.5	68.9	70.2	68.5	69.2	66.6	64.9	62.7	59.0	56.1	53.4	82.6
93	3-25	10/21/92	3-2	V	V		47*	43.0	46.7	60.9	63.6	58.0	59.1	64.1	63.6	68.2	70.6	73.1	72.5	75.1	75.9	74.8	72.6	70.7	66.8	66.6	65.6	61.8	57.3	54.5	50.9	83.3
94	3-26	10/21/92	3-2	V	V		45*	40.4	42.6	62.3	53.9	54.8	58.9	68.1	70.6	72.3	71.4	71.1	72.7	76.5	74.4	71.0	69.6	68.5	66.3	62.0	58.9	56.0	53.0	51.0	46.9	82.8
95	3-31	10/21/92	3-2	V	V		46*	41.4	48.3	53.9	66.0	56.4	59.9	62.9	63.5	65.1	67.0	69.1	73.7	74.3	75.6	72.2	71.0	69.0	68.9	63.9	62.1	58.2	54.8	53.2	51.4	82.1
96	3-35	10/21/92	3	F	V	L	53*	39.9	45.3	57.8	57.6	52.8	57.9	78.0	73.0	68.1	72.2	75.4	73.5	73.4	73.4	71.5	71.0	70.5	66.6	63.9	62.3	59.6	56.7	53.8	50.3	84.1
97	3-38	10/21/92	3	V	V		42*	37.8	42.9	52.7	67.5	59.9	61.7	66.5	65.9	68.1	76.4	73.9	71.5	73.0	72.8	72.7	72.3	69.8	66.9	65.5	63.6	62.1	56.5	54.8	49.3	83.1
98	3-39	10/21/92	3-2	F	V	L	44*	39.5	41.3	59.9	59.3	54.2	58.7	62.7	66.0	67.8	71.9	74.2	73.6	73.6	73.5	72.1	71.4	70.4	67.7	64.2	61.8	58.9	57.1	55.3	51.7	82.5
99	3-40	10/21/92	3	D		L	47*	42.1	45.7	50.6	52.8	73.5	57.5	61.0	58.7	66.2	72.0	74.5	70.6	72.6	73.3	71.5	72.1	71.1	68.6	64.1	61.1	58.2	57.5	55.9	49.4	82.6
100	3-42	10/21/92	3-2	F	V	U	41*	48.4	49.1	54.0	62.2	54.3	57.7	63.2	64.0	69.2	70.1	68.5	71.6	73.7	75.2	71.3	72.3	71.5	66.5	63.4	62.7	58.5	56.7	53.0	52.3	82.0
101	3-46	10/21/92	3-2	T	V		45*	42.8	61.2	68.3	54.2	55.7	56.3	63.8	65.4	71.0	71.4	70.8	72.5	69.5	72.3	70.8	69.4	68.8	67.7	65.3	62.8	60.3	57.6	57.1	53.3	81.4
102	3-48	10/21/92	3	D	V	L	51*	40.7	35.3	51.8	53.5	57.0	60.5	58.7	65.1	65.9	74.8	72.9	70.2	74.6	75.6	74.6	73.4	72.0	69.1	65.8	64.7	64.1	59.5	56.5	51.4	83.4
103	3-49	10/21/92	3-2	D	V		48*	39.0	50.4	60.9	55.5	61.9	60.1	63.5	65.0	66.3	67.8	73.1	73.7	75.4	76.3	73.0	75.0	71.0	68.2	68.1	68.3	65.9	59.1	56.6	51.1	83.6
104	4-1	8/08/94	3-2	V	V		65	44.0	49.2	57.4	59.7	62.5	64.7	69.8	66.8	66.8	67.8	76.6	75.9	76.0	86.6	79.5	74.6	71.5	70.0	68.5	65.2	61.3	58.1	55.9	50.6	88.9
105	4-2	8/08/94	3-2	T	V		52	37.8	42.8	61.7	55.3	54.0	59.2	59.9	62.1	63.1	67.5	70.7	70.7	73.8	72.9	69.9	68.2	68.3	66.9	63.1	61.7	56.9	54.1	55.1	46.2	80.5
106	4-3	8/08/94	3-2	FB	V	U	56	39.7	43.6	54.2	50.3	54.0	54.2	60.4	60.8	62.5	65.3	77.9	69.5	70.8	74.1	72.1	69.7	67.8	67.1	63.9	60.3	58.6	55.3	54.7	48.6	82.0
107	4-4	8/08/94	3-2	V	V		55	37.5	43.5	55.9	52.1	55.0	58.7	61.9	63.0	60.7	67.9	69.7	69.5	73.3	73.7	72.0	72.3	72.2	72.0	70.7	66.3	61.1	59.1	56.6	51.0	82.0
108	4-6	8/08/94	3-2	CC			57	39.9	45.9	59.8	64.3	56.5	59.5	60.5	63.4	62.5	65.4	75.5	74.0	75.8	76.9	76.7	72.6	70.4	68.7	66.0	65.6	60.1	58.9	55.6	50.8	84.0
109	4-7	8/08/94	3-2	FB	V		52	36.8	46.1	58.0	55.5	60.2	61.7	62.1	68.2	62.6	65.0	71.2	70.6	71.3	74.1	73.5	74.8	71.9	70.4	70.8	68.8	63.8	61.9	59.2	53.8	82.7
110	4-8	8/08/94	3-2	V	V		59	46.4	46.1	53.1	61.8	58.9	57.4	63.9	65.3	61.5	63.1	73.0	72.7	73.8	75.7	72.8	69.7	67.8	65.8	63.2	60.1	57.2	54.5	53.1	53.6	81.9
111	4-9	8/08/94	3-2	V	V		58	49.2	49.2	61.7	55.9	58.3	53.5	61.6	63.0	62.7	69.4	74.6	76.2	79.3	74.7	71.8	70.4	69.5	69.0	64.0	61.3	59.2	58.2	56.1	48.6	84.0
112	4-10	8/08/94	3-2	T	V		53	39.0	44.4	53.8	65.2	57.4	58.6	63.2	64.5	65.0	73.4	79.5	71.4	74.3	74.8	72.2	69.1	67.8	66.3	62.9	61.6	57.9	55.7	54.5	48.5	83.7
113	4-12	8/08/94	3-2	V	V		53	47.0	43.0	58.0	58.7	55.9	58.1	63.1	67.8	66.8	70.8	74.7	69.8	70.9	77.3	73.0	72.8	73.4	69.7	66.6	61.8	57.9	55.7	53.2	48.6	83.2
114	4-14	8/08/94	3-2	V	V		60	42.7	48.2	62.0	49.9	59.4	60.3	61.1	62.6	63.9	67.3	69.4	79.0	74.9	76.2	72.8	69.2	68.6	64.7	64.0	60.4	57.7	55.0	52.9	47.5	83.4
115	4-15	8/08/94	3-2	V	V		68	47.9	53.1	59.3	54.1	57.6	61.1	64.7	63.0	65.1	68.1	77.3	73.1	74.8	75.7	73.4	73.0	71.6	68.0	64.2	61.6	59.8	56.8	54.4	50.7	83.6
116	4-16	8/08/94	3-2	V	V		56	42.9	45.8	54.1	64.5	60.3	61.8	59.7	60.8	65.3	68.2	71.2	71.6	70.8	78.2	73.8	71.7	69.7	68.1	66.1	63.7	60.4	58.1	57.3	51.6	82.7
117	4-19	8/08/94	3-2	T	V		53	35.5	46.5	62.5	57.4	58.9	65.5	61.3	62.2	64.2	73.5	73.2	73.7	74.6	71.6	68.2	67.9	66.3	66.1	63.9	62.1	58.4	56.1	54.9	49.5	81.7
118	4-20	8/08/94	3-2	V	V		49	46.0	47.6	63.7	54.1	59.2	56.5	62.1	64.5	65.9	69.3	70.9	75.1	74.7	73.2	74.3	71.1	68.8	67.2	63.4	61.3	59.0	57.0	55.0	51.7	82.4
119	4-22	8/08/94	3-2	FB	V	L	54	41.5	42.1	57.3	53.4	57.9	66.1	68.0	66.8	62.7	73.9	69.0	73.6	75.3	74.0	72.6	69.0	67.9	65.9	62.2	58.6	56.2	55.4	52.8	48.0	82.4

Figure C-7. Heavy Trucks - Level, Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
120	4-23	8/08/94	3-2	V	V		54	38.0	53.0	64.8	52.9	54.8	57.6	60.0	61.8	64.4	69.0	70.6	70.3	73.4	74.6	72.0	70.6	69.5	68.1	65.3	62.9	58.9	56.7	53.4	53.4	81.5
121	4-26	8/08/94	3-2	D	V	L	48	39.8	47.6	52.5	63.7	53.1	61.6	59.9	60.2	68.9	70.2	70.2	76.6	74.2	73.5	71.4	71.7	70.7	68.2	65.6	64.5	61.8	59.7	58.1	53.8	82.7
122	4-27	8/08/94	3-2	V	V		55	45.3	49.9	60.8	55.9	60.7	61.4	65.7	65.9	63.4	65.9	72.2	75.7	72.4	75.4	72.0	69.6	69.3	66.1	63.2	60.4	57.1	56.0	54.7	50.2	82.2
123	4-28	8/08/94	3-2	FB	V	L	55	45.7	61.0	64.6	60.6	62.5	59.9	62.0	60.3	61.2	70.2	74.2	75.7	72.5	72.2	69.8	67.5	66.7	64.7	62.4	59.6	57.8	54.5	54.3	48.1	81.7
124	4-29	8/08/94	3-2	FB	V	U	52	39.6	42.8	58.2	52.5	55.7	62.5	69.0	65.1	70.6	68.8	68.8	71.8	72.3	70.4	68.2	67.6	66.1	63.0	60.6	57.0	54.2	52.6	52.0	44.2	80.2
125	4-30	8/08/94	3-2	V	V		52	39.9	46.9	55.2	53.9	54.5	60.2	59.6	62.2	63.2	68.1	70.4	72.4	75.4	74.1	72.0	71.2	71.9	71.4	67.3	65.5	64.7	60.9	58.2	54.3	82.4
126	4-31	8/08/94	3	TR			58	39.5	45.8	47.5	59.7	58.4	67.4	60.1	60.3	64.3	64.7	68.5	71.4	69.5	71.6	69.5	68.8	68.3	66.9	77.1	64.0	61.3	58.3	56.6	51.7	81.6
127	4-32	8/08/94	3-2	T	V		52	37.4	39.0	63.5	52.2	54.4	58.7	67.0	61.3	61.8	67.3	76.5	68.4	71.0	75.3	72.2	68.1	68.6	66.6	66.5	62.6	60.1	58.0	55.8	48.0	82.0
128	4-33	8/08/94	3-2	T	V		48	34.8	44.8	50.9	60.8	60.3	59.5	60.9	59.9	62.4	67.7	70.8	70.7	72.8	77.6	74.4	72.9	70.8	67.9	65.1	63.4	58.0	57.1	57.0	49.4	82.7
129	4-34	8/08/94	3-2	V	V		65	39.5	43.1	62.9	52.7	56.3	56.4	63.8	62.7	67.5	68.5	75.8	74.1	73.0	75.2	73.1	71.0	70.9	69.1	66.5	62.4	61.0	58.2	56.4	50.1	83.0
130	4-36	8/08/94	3-1	V	V		53	46.0	46.2	58.0	58.6	60.0	61.0	60.4	62.3	63.1	63.4	70.0	68.2	71.8	72.7	70.3	69.7	67.4	65.8	80.2	64.1	56.1	65.4	55.8	53.0	83.1
131	4-38	8/08/94	3	TR	V		56	38.5	36.1	52.8	59.4	52.3	56.3	61.4	59.3	63.7	64.1	72.5	72.6	69.8	71.9	69.8	69.7	66.7	64.8	61.6	61.0	59.1	57.7	54.8	53.5	80.0
132	4-39	8/08/94	3-2	V	V		56	51.8	46.6	51.9	61.4	57.4	60.4	62.0	63.0	66.5	69.6	69.6	72.4	71.2	74.8	69.9	70.3	68.9	66.0	62.2	60.5	57.8	54.8	54.0	47.9	81.0
133	4-41	8/08/94	3-2	V	V		57	43.5	43.7	52.5	73.7	64.3	57.3	63.4	62.8	64.8	66.6	74.2	75.1	73.5	74.8	72.4	71.2	70.6	67.4	65.1	62.7	59.0	57.6	56.4	53.7	83.1
134	4-42	8/08/94	3-2	FB	V		57	40.0	45.6	62.9	57.3	58.7	57.1	62.7	62.6	68.1	67.1	77.6	78.5	73.6	75.2	72.5	70.2	69.2	67.6	65.8	63.3	60.4	58.9	59.6	54.7	84.0
135	4-43	8/08/94	3-2	V	V		58	42.6	48.8	67.8	58.5	60.4	69.0	60.9	71.9	73.2	73.6	76.7	74.8	76.9	78.6	77.5	76.6	76.9	72.2	71.3	67.6	65.5	59.9	57.1	55.1	86.7
136	4-45	8/08/94	3	CM	V		55	39.7	44.8	51.8	64.1	54.9	60.3	61.5	62.8	62.7	69.1	68.9	74.6	73.6	73.7	73.3	71.6	69.8	69.5	66.8	64.6	62.1	61.6	58.7	51.6	82.2
137	4-46	8/08/94	3-2	V	V		58	44.5	45.6	52.9	62.2	57.0	60.7	64.3	64.9	61.6	66.0	69.7	71.2	73.6	75.4	73.7	73.2	71.3	67.8	65.7	64.5	61.8	59.2	58.7	51.4	82.3
138	4-47	8/08/94	3-2	T	V		61	42.2	44.1	55.8	62.5	59.9	62.5	61.1	60.9	63.6	64.7	79.1	72.0	73.4	76.1	75.3	73.7	70.9	69.4	67.5	68.8	65.2	60.3	61.4	53.9	84.3
139	5-1	8/9/94	3	D	V		54	39.7	51.8	63.3	59.0	61.0	61.1	62.5	66.5	70.7	68.5	75.1	73.4	67.8	72.4	71.8	71.4	70.4	65.7	65.5	61.4	57.8	53.9	49.9	45.5	82.0
140	5-3	8/9/94	3-2	D	V		55	49.0	54.2	60.4	54.5	56.0	61.3	60.4	61.9	66.3	69.6	78.3	68.7	71.8	76.2	73.6	76.3	70.7	68.0	65.8	65.8	59.5	56.3	53.1	48.1	83.9
141	5-7	8/9/94	3-2	V	V		53	48.4	47.5	65.9	54.4	61.5	73.4	64.0	67.3	66.9	68.5	73.3	75.2	75.0	74.3	76.8	73.9	74.6	70.6	67.4	63.7	60.4	56.4	52.0	49.3	84.5
142	5-8	8/9/94	3-2	T	V		61	34.5	46.0	56.6	54.3	59.3	63.8	69.7	67.4	68.4	70.5	73.6	75.6	70.8	73.5	72.3	71.5	70.5	67.1	65.4	62.0	60.1	55.7	52.5	48.2	82.7
143	5-9	8/9/94	3-2	D	V		54	45.9	46.4	58.3	54.2	57.6	63.2	62.1	62.5	76.7	66.1	72.3	69.5	71.5	72.0	69.5	69.4	69.4	64.5	66.1	65.2	61.1	55.1	51.5	46.6	81.8
144	5-10	8/9/94	3-2	D	V		58	40.8	50.6	52.8	69.4	67.3	63.5	66.2	67.1	73.3	72.8	78.9	75.0	76.6	75.8	76.7	78.0	77.6	77.4	74.8	73.0	71.2	66.8	63.2	58.4	87.4
145	5-11	8/9/94	4	CM			41	37.6	41.7	47.5	55.0	59.0	63.3	67.7	70.5	73.4	74.3	75.1	77.9	76.8	76.9	75.2	75.4	76.4	71.8	69.2	68.2	65.9	61.9	59.0	56.0	86.1
146	5-13	8/9/94	3-2	D	V		50	43.6	48.9	51.3	58.2	57.0	64.9	71.1	71.4	64.4	66.2	74.4	71.0	72.2	73.4	71.5	71.6	69.7	67.1	66.1	61.6	58.6	54.9	51.1	47.9	82.2
147	5-14	8/9/94	3-2	T	V		46	35.2	45.7	59.1	57.5	57.9	58.9	62.0	61.0	66.8	69.4	75.0	71.3	72.2	72.0	73.0	70.3	70.2	67.3	65.3	66.5	60.7	59.3	54.1	51.7	81.9
148	5-15	8/9/94	3-2	T	V		52	35.5	40.5	50.6	58.2	56.1	58.4	64.2	71.6	68.4	69.5	70.7	69.5	70.9	72.9	71.0	71.0	70.0	66.1	64.3	61.7	59.7	56.6	52.4	48.4	81.2
149	5-16	8/9/94	3	D	V		46	43.3	53.2	62.6	65.6	71.5	59.4	60.8	61.9	65.5	64.4	66.2	67.0	67.6	69.0	71.0	70.7	68.9	66.4	63.3	60.3	56.3	53.1	51.3	46.9	79.7
150	5-17	8/9/94	3	D	V		57	52.0	48.7	62.7	60.8	65.6	80.1	71.0	75.4	79.6	78.0	81.1	73.2	70.8	73.5	76.3	75.3	72.9	70.6	71.5	66.4	62.8	60.6	57.8	53.1	88.0
151	5-18	8/9/94	3-2	T	V		58	44.4	48.7	65.1	55.5	54.4	62.8	66.4	68.7	67.3	70.5	79.3	70.9	70.8	72.0	70.2	73.8	70.2	70.6	67.4	64.1	62.2	60.2	57.5	55.2	83.6
152	5-19	8/9/94	3	D	V		46	44.5	42.4	60.1	53.6	63.0	62.5	64.5	65.2	68.3	70.3	76.1	74.2	73.1	71.6	74.2	70.6	70.6	67.8	66.1	63.1	58.8	55.9	52.4	51.0	82.9
153	5-22	8/9/94	3	CM	V		44	35.3	41.4	52.1	52.8	62.9	62.6	69.8	67.0	76.2	70.7	73.5	76.2	75.6	74.2	76.4	75.2	72.6	69.8	67.1	66.0	65.1	62.1	59.7	54.7	85.0
154	5-23	8/9/94	3-2	T	V		44	41.0	41.8	58.6	52.9	58.2	57.9	59.9	63.3	69.6	68.4	72.5	69.8	68.7	68.2	67.6	65.7	63.9	62.7	60.4	57.2	54.4	51.6	49.6	43.6	79.0
155	5-27	8/9/94	3-2	T	V		55	40.8	44.9	47.3	58.7	59.8	64.8	68.4	75.2	70.2	68.8	74.6	71.8	73.1	75.0	72.2	70.6	69.5	68.7	66.8	65.7	60.9	57.6	55.2	51.6	83.3
156	5-28	8/9/94	3-2	FB	V	L	52	37.5	43.6	60.2	53.3	53.0	63.1	60.2	66.2	65.6	68.8	69.2	72.4	72.9	74.8	72.0	73.6	72.8	69.5	66.6	64.5	60.7	58.0	54.5	53.1	82.4
157	5-29	8/9/94	3-2	V	V		51	34.8	44.4	53.7	65.4	60.3	61.4	65.9	67.5	66.8	66.3	74.9	70.0	73.7	75.3	74.2	71.4	71.7	71.7	71.0	67.7	65.9	61.8	59.0	54.2	83.4
158	5-31	8/9/94	3-2	V	V		47	41.5	39.0	50.3	54.3	54.4	55.5	63.1	64.9	69.4	68.6	70.3	71.0	70.4	71.0	71.3	70.2	67.8	65.5	64.0	61.6	59.4	56.9	52.7	54.8	80.4

Figure C-7. Heavy Trucks - Level, Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
159	5-32	8/9/94	3-3	D	V		55	41.7	46.4	74.0	57.5	60.8	62.9	64.4	63.5	68.3	66.9	68.4	70.2	71.4	73.3	71.5	71.0	70.9	67.0	66.0	61.6	58.0	58.0	54.6	51.3	81.7
160	5-34	8/9/94	3-2		V		49	40.7	46.0	46.7	63.4	58.8	56.6	64.7	69.3	66.9	67.6	80.5	68.4	70.1	70.8	69.3	68.5	67.1	66.1	63.8	62.2	59.1	56.5	52.9	49.2	83.0
161	5-35	8/9/94	3-3	D	V		48	45.7	45.0	69.1	51.1	58.0	64.5	62.3	62.1	65.4	65.4	66.8	67.2	70.0	72.3	71.9	70.6	69.4	66.6	64.5	61.9	57.4	55.2	52.7	46.4	80.2
162	5-36	8/9/94	3-2	T	V		49	39.7	40.2	60.5	55.4	57.9	59.9	58.0	63.9	65.1	68.6	73.9	66.7	69.9	70.6	69.4	68.7	66.8	65.5	63.1	61.0	58.3	56.0	53.9	46.8	79.8
163	5-37	8/9/94	3	D	V		49	41.5	44.8	48.4	66.2	53.5	55.8	60.6	61.8	66.1	71.0	66.9	70.2	70.5	69.8	74.5	72.6	68.3	67.2	65.4	63.9	61.0	60.5	56.2	50.4	81.1
164	5-39	8/9/94	3-2	T	V		50	40.0	45.5	54.5	54.0	57.7	61.1	64.5	73.0	68.8	67.5	77.0	74.5	70.7	73.0	72.6	73.3	69.8	67.4	66.5	62.1	58.9	56.9	53.8	50.3	83.2
165	5-40	8/9/94	3-2	FB	V		57	38.9	46.8	54.6	54.5	54.4	63.9	64.3	63.6	70.6	66.4	80.0	71.7	69.9	72.4	70.1	69.5	69.0	66.1	62.3	59.9	56.8	55.7	53.9	50.0	83.0
166	5-42	8/9/94	3-2	D	V		56	43.7	44.0	52.5	61.1	62.5	61.3	62.7	64.1	65.5	67.5	69.7	70.6	69.7	72.9	72.8	71.2	69.0	69.0	64.6	62.7	58.2	55.8	52.3	50.3	80.9
167	5-43	8/9/94	3	D	V		53	40.2	41.7	53.0	65.8	55.6	55.7	62.4	59.6	60.9	71.4	78.0	67.8	68.0	70.5	70.4	71.6	67.7	66.6	63.2	61.1	57.9	55.6	51.5	48.6	81.7
168	5-44	8/9/94	4	D	V		52	39.7	45.4	49.8	74.4	55.0	60.4	61.0	67.0	68.4	73.9	84.3	76.7	71.6	71.7	74.8	72.3	69.9	68.1	66.1	62.4	60.8	57.5	56.6	51.3	86.9
169	5-45	8/9/94	2-1	V	V		51	52.1	44.7	55.9	57.2	55.1	58.9	62.7	63.3	64.6	65.6	69.6	69.7	67.8	69.2	69.3	67.0	67.1	64.8	62.9	59.7	57.7	55.7	54.4	50.0	78.5
170	5-47	8/9/94	3	D	V		52	37.0	47.8	58.5	54.6	58.2	60.1	59.8	67.0	68.5	70.7	81.9	70.9	67.4	70.3	68.5	69.6	68.6	64.7	63.7	61.4	57.7	54.2	50.8	47.9	83.9
171	5-53	8/9/94	3	D	V		45	42.3	45.7	54.9	58.6	55.5	61.6	66.4	62.4	66.2	67.2	76.0	70.1	69.1	70.5	69.7	68.7	67.8	63.4	61.7	57.9	56.7	52.3	50.6	45.6	80.6

Figure C-8. Heavy Trucks - Upgrade, Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	6-3	10/22/92	3-2	CC	H	L	50*	28.3	40.6	47.0	50.8	54.5	72.8	70.0	79.6	71.6	69.4	62.6	64.4	66.3	68.0	69.1	67.8	66.6	69.8	63.7	60.8	59.7	57.6	56.9	56.0	82.9
2	6-8	10/22/92	3-2	V	V		47*	35.9	38.3	68.2	50.7	55.1	67.8	51.1	59.1	71.0	68.3	66.9	69.1	69.9	72.9	75.6	71.5	71.8	69.6	66.3	63.9	63.0	60.8	58.5	56.1	82.1
3	6-12	10/22/92	3-2	V	V		37*	35.4	41.1	59.0	46.2	55.3	57.5	54.5	56.3	68.7	60.4	63.4	66.7	66.1	69.1	70.3	66.6	66.9	64.3	62.4	60.0	56.6	54.2	53.3	53.2	77.6
4	6-13	10/22/92	3-2	F	V		43*	36.3	39.6	73.5	54.9	59.7	69.9	68.2	63.9	67.4	77.9	75.2	74.9	70.9	71.5	70.5	70.1	67.0	65.3	64.1	61.8	58.7	57.5	57.8	50.2	83.7
5	6-15	10/22/92	3-2	V	V		42*	38.9	36.7	57.1	50.8	54.2	57.2	57.5	73.4	60.5	60.3	65.5	65.7	67.3	68.5	70.1	67.8	66.0	64.7	62.4	59.0	57.2	57.1	55.4	54.7	78.6
6	6-16	10/22/92	3-2	V	V		52*	42.5	47.9	55.1	61.2	60.8	58.9	58.7	58.8	59.8	62.5	63.9	65.8	73.3	73.9	75.0	73.8	70.7	69.2	65.8	62.9	61.1	59.8	59.1	59.0	81.6
7	6-17	10/22/92	3-2	V	V		44*	41.3	51.1	56.6	67.9	56.5	58.9	63.2	58.2	66.9	64.5	66.6	73.1	71.3	72.4	71.7	70.9	69.2	68.1	65.8	62.2	60.2	57.6	56.6	50.8	80.9
8	6-20	10/22/92	3-2	F	V	U	52*	33.4	37.9	49.5	54.0	52.9	58.4	59.7	65.2	66.9	62.5	67.4	75.7	73.1	73.3	72.9	70.8	69.3	69.2	64.4	61.6	61.1	58.0	56.1	55.9	81.8
9	6-21	10/22/92	3-2	V	V		51*	53.2	44.0	54.9	51.4	61.1	66.4	59.7	62.7	65.6	69.3	63.7	67.7	72.3	74.3	72.6	71.8	70.5	68.2	64.3	60.4	59.1	58.1	56.8	51.5	81.1
10	6-22	10/22/92	3-2	V	V		47*	43.7	48.3	67.3	56.1	60.3	63.1	64.0	67.3	65.5	70.4	67.1	67.8	74.5	74.1	72.2	71.7	69.5	66.0	64.8	62.3	59.0	58.0	54.6	52.6	81.7
11	6-23	10/22/92	3-2	T	V		53*	39.0	45.2	61.0	67.3	54.7	55.6	57.2	59.5	69.0	72.3	73.8	69.2	71.6	74.2	73.5	76.9	74.2	79.2	75.6	71.9	72.2	66.3	60.5	56.2	85.6
12	6-24	10/22/92	3	D	V		42*	41.5	44.7	64.7	54.3	53.7	59.2	54.5	52.8	58.0	67.8	63.1	65.0	68.0	70.7	72.6	68.1	67.5	67.8	63.6	63.1	58.6	55.8	52.9	55.5	78.9
13	6-28	10/22/92	2-2	V	V		50*	47.8	46.1	56.6	56.7	55.3	58.8	54.5	61.7	68.9	62.0	61.9	79.7	69.6	74.9	74.9	71.7	70.2	67.8	64.8	63.7	59.4	56.9	54.2	49.6	83.4
14	6-33	10/22/92	3-2	V	V		52*	32.7	48.1	63.3	49.6	60.8	59.5	62.6	63.5	63.3	64.5	70.6	67.2	71.4	76.7	76.0	73.8	71.5	69.4	68.0	64.5	59.5	55.6	51.4	48.2	82.7
15	6-37	10/22/92	3-2	V	V		51*	35.6	43.4	62.2	51.0	58.6	56.0	57.1	56.9	60.3	66.6	64.9	65.2	74.3	75.2	73.0	68.3	68.4	68.4	64.8	62.0	60.1	57.2	54.4	55.6	80.9
16	6-42	10/22/92	3-2	T	V		50*	40.5	49.8	54.2	51.8	60.8	59.1	56.2	58.5	61.3	71.2	67.1	69.3	72.2	73.4	75.0	71.5	70.6	68.0	65.7	63.5	61.0	60.4	57.5	53.6	81.5
17	6-44	10/22/92	3-2	V	V		35*	31.9	46.5	58.6	71.0	60.2	64.1	65.7	73.5	64.2	63.9	64.1	66.0	68.8	69.1	70.2	69.2	67.8	64.6	64.3	68.6	66.0	63.1	56.6	54.0	80.6
18	6-47	11/23/93	3-2	F	V	L	42	39.2	40.6	64.2	45.5	54.1	59.1	57.7	61.0	63.0	69.4	59.1	62.5	64.2	68.2	69.5	66.7	65.6	63.1	62.2	58.9	57.2	55.4	50.2	47.0	77.1
19	6-50	11/23/93	2-2	V	V		46	41.3	49.1	57.5	65.0	56.8	61.9	57.7	62.9	71.4	77.6	75.6	71.8	72.5	76.6	74.2	74.0	72.3	70.7	68.8	67.9	66.5	62.1	60.1	55.5	84.7
20	6-53	11/23/93	3-2	V	V		49	40.5	68.2	47.1	59.8	57.0	57.1	58.9	59.5	64.1	61.9	71.1	74.3	73.3	75.6	73.6	74.3	72.6	69.8	67.0	65.2	62.7	63.1	62.4	52.9	83.1
21	6-55	11/23/93	3-2	V	V		36	47.8	60.2	60.7	58.7	66.2	63.0	62.7	61.7	69.4	65.3	66.8	73.2	71.1	73.9	73.1	71.7	70.7	68.1	68.3	66.5	61.4	57.9	53.6	52.4	81.9
22	6-61	11/23/93	3-2	V	V		34	41.9	47.8	64.7	52.9	59.4	70.6	66.2	67.5	67.7	62.4	66.8	69.4	71.3	73.6	75.9	71.6	70.4	68.2	65.0	64.0	61.4	60.9	57.4	53.0	82.1
23	6-63	11/23/93	3-2	H	V		48	42.4	57.6	60.3	55.0	58.5	59.2	60.3	61.1	62.6	67.0	74.7	67.8	74.3	77.5	74.2	71.8	69.0	66.8	65.9	63.9	59.3	56.6	53.9	49.6	82.9
24	6-64	11/23/93	3-2	V	V		30	42.1	45.6	73.0	60.3	59.0	67.8	60.9	66.9	63.1	60.2	64.6	68.7	68.2	71.5	71.0	72.0	70.4	69.5	66.2	63.5	64.6	59.9	57.0	55.7	81.1
25	6-65	11/23/93	3-2	V	V		36	46.6	42.7	62.8	54.1	55.3	58.6	58.4	61.8	71.0	62.8	62.2	65.9	67.4	69.7	68.8	68.0	67.5	64.3	65.9	60.8	58.2	58.9	52.5	49.0	78.4
26	6-67	11/23/93	3-2	V	V		44	43.0	49.7	69.3	59.7	63.1	76.8	68.0	70.5	75.8	79.8	79.0	75.2	78.1	79.3	80.2	81.2	81.8	81.1	77.8	73.9	70.6	66.3	64.3	59.8	90.4
27	6-68	11/23/93	3-2	F	V		32	48.6	41.9	65.5	50.4	57.0	60.9	59.1	56.6	64.2	63.1	63.6	72.0	76.5	72.3	74.4	73.9	70.6	70.3	67.5	68.2	63.9	62.7	58.5	56.4	82.6
28	6-71	11/23/93	3-2	F	V		36	39.7	42.4	59.7	54.4	57.8	61.6	62.3	63.0	71.4	64.4	63.4	71.3	70.3	72.5	72.0	72.9	70.1	68.6	66.4	65.1	61.0	56.8	58.4	52.2	81.2
29	6-73	11/23/93	3-2	V	V		51	43.9	41.8	64.8	49.6	61.7	60.9	59.0	65.4	65.9	67.6	67.2	68.6	74.4	78.6	74.6	73.6	72.3	70.0	68.5	64.5	59.4	56.3	55.4	52.1	83.5
30	6-82	11/23/93	3-2	V	V		53	39.8	43.3	65.5	52.5	57.0	58.5	54.6	58.5	60.2	67.5	62.5	68.3	78.8	75.4	74.7	73.6	70.6	67.7	66.5	64.0	59.2	56.3	54.6	50.8	83.2
31	6-83	11/23/93	3-2	F	V	L	33	43.0	46.7	71.7	55.8	59.9	67.2	60.5	64.2	65.6	72.3	63.9	67.7	73.7	71.7	70.4	70.9	74.4	68.9	68.7	73.2	73.6	67.3	56.9	50.7	83.2
32	6-84	11/23/93	3-2	V	V		53	46.9	52.3	59.7	57.7	61.5	59.9	62.8	64.1	62.5	66.0	68.6	72.3	75.6	78.2	76.0	73.5	72.3	70.1	67.4	65.3	63.5	61.3	57.3	51.9	83.9
33	6-86	11/23/93	3-2	V	V		54	45.0	46.8	68.6	56.6	60.5	67.9	61.1	63.2	70.7	67.9	77.0	68.6	74.2	81.7	80.8	77.1	74.6	72.6	68.7	65.4	62.8	59.8	58.1	53.2	87.0
34	6-90	11/23/93	3-2	V	V		42	40.3	42.8	42.6	61.9	63.7	56.7	62.8	62.8	75.5	70.4	67.7	66.7	72.1	73.9	72.2	69.6	70.2	67.4	64.5	66.4	63.9	57.9	54.8	48.9	82.0
35	6-94	11/23/93	3-2	F		U	49	39.0	45.0	71.9	57.5	67.5	73.3	67.8	78.0	73.7	74.7	76.4	76.2	79.6	79.6	80.5	81.7	80.1	76.7	70.6	72.4	70.9	67.7	62.1	57.5	89.5
36	6-95	11/23/93	3-2	V	V		32	44.8	39.1	64.3	57.2	61.1	57.7	56.7	61.5	67.4	65.7	69.2	70.6	73.0	75.1	74.6	73.0	71.9	69.8	66.5	66.3	62.7	57.5	55.8	52.0	82.4
37	6-96	11/23/93	3-2	V	V		67	51.6	52.4	67.3	56.0	60.7	64.5	64.4	65.4	68.6	69.6	80.1	71.7	75.2	80.2	77.0	76.1	76.2	73.5	70.6	68.1	64.9	62.0	59.4	59.4	86.7
38	6-97	11/23/93	3	D	V	L	25	37.8	45.1	50.7	70.2	59.9	59.0	66.9	74.2	70.1	78.6	81.7	76.9	75.5	80.5	77.2	80.4	80.2	80.2	77.7	75.8	73.5	68.2	64.4	59.8	89.9
39	6-100	11/23/93	3-2	V	V		52	45.7	54.8	61.4	54.4	58.7	57.3	62.3	64.1	63.0	62.6	76.4	66.7	72.2	77.8	77.8	73.4	71.5	70.4	66.7	64.3	61.0	58.3	53.7	49.8	84.0
40	7-2	8/1/94	3	TR	V		49	38.3	45.7	46.1	63.3	55.0	56.7	56.0	58.9	66.8	62.8	69.7	64.3	65.7	71.1	65.6	67.4	64.2	66.9	70.2	65.8	60.5	57.3	54.1	49.1	78.6
41	7-3	8/1/94	3-2	V	V		34	51.0	58.7	49.6	59.3	58.6	61.1	60.0	62.6	68.7	63.8	60.4	64.7	65.1	64.8	64.5	63.2	63.4	62.3	60.1	59.1	58.2	60.6	59.6	55.9	76.1

Figure C-8. Heavy Trucks - Upgrade, Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	7-4	8/1/94	3-2	V	V		40	34.9	39.4	66.0	53.6	54.7	60.6	58.3	65.5	66.9	69.8	65.7	66.0	68.3	68.1	68.7	69.5	68.7	68.1	64.8	64.9	63.1	63.9	61.2	55.0	79.5
43	7-6	8/1/94	3-2	V	V		39	38.8	46.6	59.4	53.9	52.6	54.7	63.3	58.1	61.1	71.7	63.3	65.1	65.1	64.1	65.1	64.8	63.0	62.5	59.5	57.7	54.6	53.6	52.8	51.2	76.5
44	7-7	8/1/94	3-2	V	V		38	35.1	40.0	52.1	65.9	57.3	65.6	61.9	65.3	68.7	75.9	66.8	68.2	66.0	67.8	70.5	69.7	69.4	66.3	65.2	61.2	58.7	57.9	56.6	61.9	80.9
45	7-10	8/1/94	3-2	V	V		48	42.5	43.2	63.5	51.8	47.6	59.8	55.0	54.8	57.4	63.6	66.8	68.0	77.6	69.6	66.2	67.8	67.4	64.1	62.8	58.3	54.8	52.6	52.1	50.2	80.3
46	7-12	8/1/94	3-2	V	V		37	32.0	39.5	54.9	48.4	56.7	60.8	58.3	58.8	59.5	63.1	62.3	62.6	70.0	67.1	65.5	65.4	63.4	61.5	62.2	58.9	57.4	54.5	52.4	47.3	75.9
47	7-13	8/1/94	3-2	V	V		52	35.7	43.1	64.3	51.9	59.3	66.7	63.6	61.6	66.3	64.7	71.4	67.5	70.2	72.0	68.6	69.0	68.8	69.1	65.3	66.8	65.3	63.9	62.6	55.5	80.5
48	7-14	8/1/94	3-2	FB	V	L	52	35.3	36.5	57.0	71.4	52.1	57.4	54.3	61.6	61.8	71.8	61.6	67.1	72.2	69.3	69.2	66.7	65.7	65.2	62.1	61.1	61.7	59.4	56.8	57.4	79.6
49	7-16	8/1/94	3-2	V	V		38	36.3	49.1	59.7	47.9	58.8	62.5	54.2	56.2	56.5	60.5	61.9	64.3	66.9	65.9	68.4	68.1	65.5	63.6	63.2	59.8	58.3	57.0	58.0	57.8	76.4
50	7-17	8/1/94	2-2	V	V		45	41.5	43.9	57.6	51.6	53.4	59.6	59.2	61.3	60.7	64.3	71.8	69.8	65.7	68.1	67.5	65.9	65.1	64.5	64.5	62.8	60.8	58.1	54.5	52.0	78.2
51	7-18	8/1/94	3-2		V	L	46	33.3	45.3	60.4	50.6	57.3	56.5	55.9	60.7	64.5	75.2	70.4	66.6	69.1	67.6	69.9	68.5	71.4	68.4	64.6	62.6	61.7	60.6	58.4	55.0	80.6
52	7-19	8/1/94	3-2	V	V		40	39.4	49.3	63.5	55.6	60.2	70.2	59.6	70.5	68.2	69.6	72.5	69.9	67.9	70.5	67.9	68.7	69.2	66.2	63.5	62.2	60.0	57.5	56.6	57.4	80.8
53	7-20	8/1/94	3-2	V	V		35	33.9	62.3	45.5	49.3	63.9	60.0	61.1	59.1	68.2	65.1	74.2	78.4	63.3	65.1	64.9	62.0	62.5	68.9	72.9	73.5	72.8	67.9	58.9	53.2	83.0
54	7-21	8/1/94	3-2	V	V		43	46.0	46.6	68.4	51.6	59.5	64.8	61.8	64.7	69.4	71.5	63.9	67.0	68.2	67.4	65.9	66.0	64.8	65.4	62.7	65.3	61.1	62.9	61.4	52.1	79.2
55	7-22	8/1/94	3-2	T	V		41	36.5	67.2	47.8	53.7	51.2	53.8	60.5	66.1	62.3	72.2	69.1	65.5	68.7	68.6	67.3	66.1	65.4	63.5	65.2	67.9	68.2	66.3	60.9	55.5	79.7
56	7-23	8/1/94	3-2	V	V		42	39.3	43.4	63.2	61.4	59.1	62.1	57.5	61.9	58.7	72.8	62.2	66.1	68.4	66.9	66.9	65.2	63.2	62.4	60.5	59.9	58.1	56.5	55.3	62.6	78.0
57	7-24	8/1/94	3-2	FB	V	L	51	35.9	49.5	50.0	64.0	56.6	61.6	59.1	62.2	66.3	64.3	77.3	68.5	69.7	69.9	68.9	69.0	68.9	65.8	64.9	64.5	59.6	58.6	59.2	51.9	81.1
58	7-26	8/1/94	3-2	V	V		37	38.5	43.4	63.9	48.0	59.1	65.7	57.5	57.0	62.3	68.3	64.2	66.6	66.9	67.9	67.6	67.4	66.5	66.6	62.4	66.3	64.1	64.9	61.5	55.7	78.4
59	7-27	8/1/94	2-2	FB	V	L	36	37.5	39.7	48.6	48.3	67.5	82.0	58.8	63.9	69.8	70.0	71.7	75.0	75.9	71.1	71.6	70.9	72.9	69.5	68.5	66.7	63.5	58.2	52.3	48.2	85.5
60	7-29	8/1/94	3-2	V	V		43	35.4	42.0	68.2	54.7	57.4	65.3	57.9	59.3	64.7	67.4	63.0	64.9	66.4	70.6	68.6	67.4	65.2	67.0	63.0	64.5	61.5	62.3	62.0	54.5	78.6
61	7-31	8/1/94	3-2	FB	V		54	35.7	43.1	65.9	52.1	57.4	62.3	57.1	61.3	66.5	69.8	78.2	70.3	67.2	69.9	69.2	68.4	67.5	64.3	64.2	62.4	59.9	57.9	54.2	52.5	81.6
62	7-32	8/1/94	3-2	T	V		46	37.0	42.5	61.3	58.7	60.5	53.5	55.1	54.3	55.0	75.7	73.2	61.6	67.5	67.6	67.4	67.8	66.1	65.7	61.4	63.3	61.1	58.6	56.8	52.0	80.0
63	7-33	8/1/94	3-2	V	V		39	39.3	43.5	61.4	54.2	59.2	58.9	56.0	56.9	63.9	69.1	65.5	64.3	68.6	67.4	68.2	66.9	66.7	64.5	63.0	59.9	57.7	55.1	56.5	51.1	77.6
64	7-34	8/1/94	3-2	V	V		49	35.4	47.8	62.2	53.4	56.6	66.9	57.7	61.5	62.8	68.1	72.3	66.2	69.7	68.0	65.8	66.7	65.5	63.9	62.3	61.4	57.2	55.4	54.1	49.3	78.7
65	7-35	8/1/94	3-2	CC	V		42	29.6	65.9	52.8	51.8	71.9	59.6	66.4	56.8	60.8	73.4	68.9	66.1	72.5	74.0	67.7	67.5	66.0	63.1	62.0	60.6	57.0	56.7	62.1	52.9	81.0
66	7-37	8/1/94	2-2	V	V		50	36.0	40.0	65.3	53.2	57.4	62.4	59.9	62.0	61.9	62.7	69.4	67.4	66.2	69.8	70.6	68.1	67.4	65.1	65.6	65.5	61.5	60.4	58.5	56.5	78.9
67	7-40	8/1/94	3-2	V	V		49	40.7	47.1	62.4	56.5	61.0	61.8	64.8	59.8	64.8	73.1	70.8	68.1	69.2	71.4	69.4	67.1	67.9	67.0	64.7	65.4	63.7	63.3	65.1	61.3	80.6
68	7-41	8/1/94	4	T			46	32.5	32.8	67.3	59.9	58.5	55.3	56.1	55.7	65.8	69.8	66.7	67.1	68.4	68.4	69.7	69.0	68.8	67.4	66.1	64.8	62.7	61.2	62.7	59.9	79.5
69	8-2	12/08/92	2-2	F	V		53	40.6	42.1	59.5	55.5	52.8	53.7	56.7	58.4	62.9	69.9	73.2	71.0	70.7	74.9	76.3	73.8	71.8	69.0	67.2	68.5	66.3	61.3	57.6	52.9	83.0
70	8-8	12/08/92	2-2	V	V		51	43.2	49.4	51.9	63.6	55.8	57.8	64.1	61.1	68.2	71.0	76.0	71.7	74.4	78.1	74.6	72.5	72.3	69.5	65.1	63.7	63.1	56.9	54.1	50.5	84.1
71	8-11	12/08/92	3-2	V	V		57	44.2	46.1	66.3	53.6	55.9	59.2	58.0	60.3	63.4	66.3	70.6	71.2	73.6	79.1	77.1	74.2	74.5	69.8	66.5	65.8	61.5	58.0	56.3	52.6	84.3
72	8-13	12/08/92	3-2	F	V	L	55	44.4	54.2	69.6	59.1	59.4	60.8	64.6	63.8	66.7	69.0	78.8	72.1	72.0	76.6	76.8	73.3	71.1	67.7	65.7	65.7	61.7	58.0	56.9	57.4	84.5
73	8-15	12/08/92	3-2	V	V		54	44.4	45.0	52.0	60.0	57.5	57.1	58.7	60.9	64.4	70.6	75.7	73.7	74.2	74.6	73.2	72.4	70.4	68.3	64.5	61.9	58.7	55.2	54.1	49.8	82.9
74	8-17	12/08/92	3-2	V	V		58	41.3	50.6	50.4	64.5	58.8	63.6	67.4	68.2	72.1	72.7	79.4	73.3	74.0	75.2	74.3	73.9	72.7	69.3	68.1	64.6	60.9	58.0	54.4	52.0	84.9
75	8-22	12/08/92	3-2	V	V		55	41.0	42.6	59.9	51.7	54.8	62.4	61.7	61.0	63.9	68.0	74.9	72.5	74.0	79.6	77.0	73.6	70.6	68.7	65.5	64.9	60.3	57.0	53.3	49.7	84.5
76	8-23	12/08/92	3-2	F	V	L	56	43.2	49.2	58.8	60.0	54.7	57.6	58.4	59.4	61.4	71.6	68.6	68.0	74.7	74.5	73.5	71.6	69.2	67.4	65.0	61.8	58.7	57.9	54.3	48.6	81.7
77	8-24	12/08/92	3-2	H	V		59	42.8	43.8	52.9	66.0	57.3	62.1	65.0	62.5	66.6	72.9	78.1	74.9	74.9	77.5	74.6	72.2	70.2	67.7	64.7	63.4	59.8	57.5	59.4	56.0	84.6
78	8-25	12/08/92	3-2	V	V		46	44.3	47.7	64.5	55.5	58.8	61.5	58.6	60.7	61.8	68.6	75.7	69.6	72.4	76.0	72.2	71.8	69.4	67.2	63.5	60.3	58.0	55.4	57.0	56.0	82.3
79	8-26	12/08/92	3-2	V	V		48	44.7	53.3	67.6	55.2	58.9	63.2	60.8	62.2	64.9	72.8	73.6	72.0	72.2	72.4	70.2	70.6	68.7	66.7	63.4	63.4	60.7	57.7	55.6	51.5	81.7
80	8-27	12/08/92	3-2	F	V	L	60	44.7	46.2	59.9	53.4	58.4	57.8	58.0	57.3	63.0	73.1	71.4	71.2	77.8	77.4	73.3	71.8	69.8	66.5	64.3	61.3	58.3	56.5	56.4	49.6	83.5

Figure C-8. Heavy Trucks - Upgrade, Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
81	8-28	12/08/92	3	TR	V		52	40.1	44.5	47.8	62.2	54.4	53.3	60.0	55.0	64.5	63.0	66.5	68.6	70.7	75.4	73.3	70.9	68.2	65.1	62.6	61.0	56.3	53.4	50.2	46.5	80.6
82	8-30	7/21/94	3-2		V		53	40.6	44.7	62.1	52.1	55.3	56.0	56.0	58.4	60.6	64.9	78.9	68.1	68.3	74.0	68.8	67.4	65.1	63.3	61.4	56.9	53.2	52.3	50.7	47.8	81.6
83	8-31	7/21/94	3-2	V	V		58	44.0	47.1	62.7	47.6	52.9	60.3	56.9	61.5	63.9	62.8	70.7	72.9	70.2	71.9	69.2	69.5	69.1	68.0	68.2	67.5	63.5	60.6	56.3	52.8	80.6
84	8-32	7/21/94	3-2	V	V		54	39.2	48.4	51.3	61.3	52.7	55.5	59.6	60.4	67.6	66.4	74.0	70.1	73.7	73.0	71.0	70.3	71.2	67.3	64.0	62.3	60.3	58.1	56.3	51.9	81.5
85	8-33	7/21/94	3-2	V	V		50	39.0	51.0	60.2	54.4	50.7	51.6	56.0	56.2	58.9	60.4	75.3	67.4	66.3	72.5	70.5	67.9	66.4	67.1	61.2	58.8	56.6	56.3	54.6	51.2	79.9
86	8-34	7/21/94	3	FB		L	51	36.2	38.9	54.5	54.6	56.8	56.3	55.5	67.5	72.8	76.4	68.8	69.1	71.1	71.8	73.3	71.9	67.4	65.5	63.6	62.0	59.5	57.1	55.4	54.6	82.2
87	8-35	7/21/94	3	T	V		48	36.0	44.6	50.9	51.3	48.5	53.6	53.4	59.0	67.3	72.9	61.2	66.8	70.9	73.1	70.5	69.1	70.8	64.5	62.9	61.8	59.6	57.2	54.8	49.5	80.2
88	8-36	7/21/94	2-2	V	V		45	44.3	48.2	44.2	61.0	52.4	50.1	54.7	58.5	57.5	63.9	62.0	64.9	68.9	70.2	67.8	65.6	66.2	64.5	64.1	58.5	55.9	53.6	52.6	50.4	76.9
89	8-40	7/21/94	3-2	V	V		52	40.1	44.6	58.5	49.1	53.5	52.9	52.0	59.1	59.6	63.6	73.7	69.0	67.4	72.0	70.4	67.4	66.0	65.2	62.9	63.6	58.1	58.0	54.1	52.3	79.5
90	8-41	7/21/94	3-2	V	V		50	41.1	57.7	48.7	59.1	63.2	59.7	57.9	63.7	61.2	66.0	70.9	65.7	68.6	68.4	67.8	67.0	70.5	70.0	67.2	65.9	62.6	62.7	65.3	62.9	79.8
91	8-43	7/21/94	2-2	V	V		55	35.6	40.1	55.7	59.1	52.3	55.7	65.5	57.9	61.6	66.6	61.7	65.7	67.4	71.0	69.5	68.3	67.7	66.8	68.8	67.1	61.1	58.8	55.9	50.7	78.9
92	8-44	7/21/94	2-2	V	V		39	42.4	48.7	63.8	50.8	52.1	57.6	50.5	57.1	56.9	64.8	66.8	66.7	65.4	66.0	65.8	64.5	63.6	61.4	58.0	56.1	53.2	52.6	52.0	49.0	75.6
93	8-45	7/21/94	3-2	FB	V	U	48	40.0	44.9	61.3	48.9	52.9	59.8	62.4	59.4	62.6	66.2	68.0	67.1	74.8	72.8	68.9	67.4	65.0	61.6	59.8	57.9	56.5	52.5	49.8	50.7	79.6
94	8-46	7/21/94	3-2	V	V		54	40.5	45.2	66.9	49.0	56.4	58.4	58.3	61.5	65.2	75.5	75.5	76.7	73.3	73.1	72.5	73.0	71.2	70.1	72.8	72.5	72.3	66.1	66.6	59.0	84.7
95	8-47	7/21/94	3-2	V	V		46	43.1	38.0	62.8	54.6	55.9	55.0	54.8	59.2	62.9	63.7	63.5	66.4	70.7	71.3	69.0	67.4	66.0	64.1	61.2	58.5	57.4	55.7	56.5	50.4	78.0
96	8-48	7/21/94	3-2	V	V		54	42.0	49.0	58.3	55.2	54.7	62.6	59.7	66.0	70.1	66.0	69.4	69.2	71.7	76.6	73.5	72.6	69.9	68.1	67.4	65.4	64.1	62.0	59.8	56.7	82.4
97	8-55	7/21/94	3-2	T	V		53	35.3	43.3	46.3	63.6	50.9	52.5	58.8	57.5	56.9	62.1	69.6	70.4	75.5	78.2	73.3	70.7	68.8	68.2	66.2	63.1	60.5	60.5	59.6	58.9	82.7
98	8-56	7/21/94	3-2	V	V		50	36.5	40.2	57.3	58.7	56.9	58.7	58.8	62.5	63.6	66.6	80.0	71.2	70.2	75.5	72.2	71.4	70.0	68.9	68.0	64.1	62.2	58.6	57.6	54.2	83.7
99	8-58	7/21/94	3	D	V		45	40.5	43.2	56.3	53.6	52.6	59.0	55.3	57.6	60.4	65.0	64.6	80.5	71.1	69.8	71.2	67.5	65.8	67.3	61.8	60.0	58.4	56.4	53.8	51.2	82.5
100	8-59	7/21/94	3-2	V	V		58	35.8	47.4	57.4	68.0	54.7	59.5	60.8	62.0	64.4	66.9	66.9	73.1	70.2	70.4	70.7	71.0	68.6	67.7	70.0	65.8	66.5	66.3	65.1	66.3	81.4
101	8-60	7/21/94	3-2	V	V		58	46.4	44.8	53.7	68.2	60.0	62.3	61.0	63.3	64.0	62.6	72.0	68.9	68.4	75.8	69.1	67.9	68.0	65.1	64.3	63.7	64.0	62.0	55.7	50.4	80.8
102	8-61	7/21/94	2-2	V			53	42.0	48.2	53.2	62.7	56.1	57.9	60.3	59.5	58.1	59.6	61.9	75.5	71.3	74.5	73.8	73.9	71.7	69.8	65.4	62.0	59.9	57.7	58.2	53.0	82.2
103	8-62	7/21/94	3-2	T	V		44	38.4	40.3	57.0	50.8	54.7	59.1	55.6	55.5	61.2	73.0	71.2	66.3	67.9	70.7	69.8	66.3	66.4	64.4	62.8	63.2	60.2	56.0	54.1	49.4	79.3
104	8-64	7/21/94	3-2	V	V		48	46.1	46.7	50.9	65.8	57.6	63.0	61.5	62.2	64.5	68.7	70.2	69.8	72.2	76.4	71.9	70.2	68.0	66.1	65.1	65.1	62.4	60.4	58.0	57.8	81.7
105	8-65	7/21/94	3-2	V	V		58	42.8	43.1	54.5	66.1	55.9	54.1	58.0	58.6	60.0	69.0	72.4	70.0	69.1	73.9	71.7	71.1	69.6	67.4	66.0	62.9	60.8	57.8	56.1	51.2	81.0
106	8-67	7/21/94	3-2	V	V		51	40.1	57.0	62.3	55.1	52.0	51.8	57.5	54.5	55.8	61.7	72.3	65.0	69.0	71.7	69.5	65.5	64.7	63.3	61.0	60.7	57.2	56.3	53.9	49.4	78.4
107	8-69	7/21/94	3-2	V	V		48	35.8	41.2	61.4	51.4	56.2	55.8	58.5	65.2	67.2	65.4	73.4	69.4	69.0	70.7	69.4	67.7	67.1	66.7	67.8	71.7	66.3	64.9	62.4	56.8	80.8
108	8-71	7/21/94	3-2	V	V		49	42.8	50.8	62.7	57.8	58.7	59.3	64.4	66.6	62.2	72.1	69.6	68.4	71.8	72.6	70.2	69.9	67.8	65.4	62.6	62.0	60.6	58.5	57.2	51.6	80.6
109	8-73	7/21/94	3-2	FB	V	L	52	38.9	49.6	50.5	64.0	57.7	60.7	61.5	64.2	70.2	77.0	81.7	76.3	69.9	73.3	73.7	74.5	75.5	73.0	74.2	70.6	65.8	61.6	57.8	54.5	86.4
110	8-75	7/21/94	3-2	V	V		53	37.2	39.4	58.1	49.6	58.5	59.5	51.4	53.5	56.9	57.8	60.3	64.5	71.5	71.2	69.6	68.8	67.4	65.3	61.8	58.6	56.1	54.1	54.4	49.3	78.0
111	8-76	7/21/94	3-2	FB	V		48	44.8	45.7	66.7	46.4	54.8	60.7	59.0	56.2	65.5	71.8	75.9	70.7	68.3	71.4	68.0	68.6	67.5	68.1	72.0	73.1	67.6	61.6	58.1	55.0	82.2
112	8-78	7/21/94	3	T	V		49	38.5	40.9	49.0	52.8	52.5	50.6	55.9	58.8	59.6	67.9	72.7	64.3	65.4	69.7	70.5	66.1	64.5	64.3	62.7	61.1	56.0	53.1	50.9	47.4	78.3
113	8-79	7/21/94	3-2	V	V		50	49.6	46.5	61.5	62.6	58.7	59.3	62.4	62.9	63.4	75.6	69.0	67.9	70.0	69.7	71.2	68.2	66.7	67.4	67.5	66.0	61.1	61.5	58.5	51.8	80.9
114	11-2	09/17/92	3-2	V	V		51*	39.2	39.4	61.8	53.7	56.3	58.7	59.1	60.7	59.7	67.2	71.7	71.5	73.1	74.4	71.2	69.2	68.4	67.7	64.1	64.1	60.7	61.9	58.8	54.8	81.2
115	11-4	09/17/92	3-2	V	V		53*	45.3	54.7	54.5	67.8	57.3	60.8	64.8	65.6	60.6	67.7	72.3	71.9	73.7	73.5	70.5	71.2	68.9	67.7	65.3	63.8	60.2	61.7	56.7	51.3	81.7
116	11-5	09/17/92	3	G	V		48*	49.2	42.0	44.9	61.7	52.7	56.2	59.9	62.1	62.7	69.4	68.3	68.5	69.5	70.3	69.4	70.2	68.5	70.5	67.9	67.3	63.9	63.6	63.6	62.1	80.4
117	11-8	09/17/92	3-2	V	V		53*	46.2	50.9	58.2	58.4	60.3	58.4	60.5	59.8	64.5	65.9	74.8	71.6	72.6	73.6	70.5	68.9	66.9	65.9	63.7	61.6	59.0	59.9	56.1	55.9	81.2
118	11-10	09/17/92	3	F	V	L	48*	37.3	38.2	42.5	64.1	57.0	56.1	58.6	54.5	61.1	68.1	79.0	70.0	72.9	74.6	72.6	73.6	70.6	68.0	65.4	64.2	63.2	70.7	64.5	57.5	83.7
119	11-11	09/17/92	3-2	V	V		53*	42.4	50.4	56.2	61.4	57.6	58.4	60.5	58.8	60.0	65.1	67.3	74.2	77.9	73.4	71.1	70.2	68.8	66.9	65.3	63.5	60.9	60.3	60.5	57.2	82.3

Figure C-8. Heavy Trucks - Upgrade, Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	VXH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
120	11-14	09/17/92	3-2	T	V		53*	37.6	46.9	58.2	52.0	57.2	60.7	65.8	62.4	67.6	72.7	70.0	71.6	74.6	71.2	70.6	68.3	67.5	65.5	64.2	68.1	65.5	63.7	60.6	53.1	81.6
121	11-15	09/17/92	3-2	V	V		52*	45.5	50.3	62.1	58.4	62.0	60.0	60.8	60.4	62.4	72.7	71.5	70.2	72.8	73.4	69.8	69.2	66.4	64.7	62.1	59.6	59.5	60.0	57.8	54.5	80.9
122	11-16	09/17/92	3-2	V	V		52*	46.8	45.5	56.9	54.8	53.7	57.1	61.8	58.9	61.7	62.5	73.8	70.3	70.4	74.0	71.4	69.2	67.7	65.9	67.2	64.0	59.3	59.7	57.6	56.0	80.8
123	11-20	09/17/92	3	D	V		48*	40.0	38.0	52.9	75.0	63.1	52.8	65.9	70.9	73.4	68.7	66.2	67.3	70.8	69.8	67.3	68.5	66.1	64.5	61.9	61.1	59.4	56.2	54.6	49.6	81.3
124	11-22	09/17/92	3-2	V	V		54*	42.5	46.4	54.1	57.7	55.4	57.0	61.0	60.4	63.4	66.7	71.4	70.7	73.2	75.2	74.1	69.2	66.6	65.8	64.7	60.1	58.2	58.6	58.4	57.2	81.5
125	11-23	09/17/92	3-2	V	V		54*	44.3	47.6	61.4	62.8	61.6	64.1	64.8	65.7	67.7	67.1	73.1	70.8	73.6	75.4	72.6	72.7	69.9	67.7	65.6	64.7	62.4	62.0	59.7	57.2	82.5
126	11-24	09/17/92	3-2	V	V		56*	48.1	49.2	62.9	55.7	58.0	57.9	65.6	63.7	66.2	69.9	71.1	77.9	76.7	74.1	70.5	69.3	68.8	66.8	64.6	62.4	61.0	60.8	60.4	57.8	83.3
127	11-27	09/17/92	3	G	V		46*	42.6	47.9	45.3	68.0	56.1	57.0	59.1	61.1	67.1	72.7	67.3	68.4	72.2	70.6	69.7	68.1	67.3	65.3	62.2	60.6	58.2	57.8	56.3	50.2	80.1
128	11-28	09/17/92	3-2	V	V		53*	35.4	42.3	61.4	51.8	58.1	55.7	58.1	60.1	68.6	73.1	70.3	71.9	74.6	71.1	70.0	69.4	69.6	67.4	63.7	61.4	59.2	59.1	58.1	56.3	81.4
129	11-30	09/17/92	3	D	V		49*	42.1	44.4	65.0	72.6	59.5	59.8	62.7	61.2	65.6	75.0	72.2	75.0	71.4	72.2	73.0	71.4	70.6	70.1	67.5	67.9	65.6	64.3	61.5	57.8	83.3
130	11-33	09/17/92	3-2	F	V	L	54*	40.9	45.3	60.4	55.2	58.5	60.3	61.8	67.1	67.7	73.0	71.4	73.8	73.5	73.5	71.2	69.8	68.8	65.9	64.3	65.3	62.3	60.1	58.6	53.7	82.1
131	11-34	09/17/92	3-2	D	V		55*	39.1	48.1	57.1	64.1	62.3	66.7	65.8	62.7	66.6	65.7	74.5	75.4	72.8	74.2	72.7	70.8	69.1	66.7	65.5	65.1	62.1	59.1	56.5	51.8	82.7
132	11-35	09/17/92	3-2	T	V		56*	43.2	44.1	44.3	64.2	55.5	56.0	61.7	63.1	64.4	77.5	73.0	73.5	77.0	72.7	70.6	70.0	69.2	67.8	64.9	63.5	60.4	57.9	56.1	54.9	83.4
133	11-36	09/17/92	3	TR	V		51*	33.0	37.6	62.9	48.9	52.2	59.9	61.5	56.8	68.5	68.7	71.8	70.2	71.3	72.9	72.5	68.5	72.1	65.9	65.5	67.0	62.5	59.6	56.3	50.9	81.3
134	11-38	09/17/92	3-2	V	V		51*	41.1	45.5	50.4	52.8	56.1	57.5	63.8	58.5	64.2	72.2	69.9	71.2	74.4	71.4	68.3	68.8	68.0	64.3	62.0	59.7	57.8	55.5	53.6	48.8	80.6
135	11-39	09/17/92	3-2	V	V		51*	44.4	45.7	59.0	57.5	56.8	56.8	58.6	66.6	67.6	72.0	72.2	70.5	73.2	70.6	68.1	67.6	65.9	64.8	62.1	58.8	55.9	54.0	53.9	53.6	80.5
136	11-40	09/17/92	3-2	V	V		53*	41.6	50.8	61.7	57.5	54.8	57.4	61.0	59.6	66.3	66.6	68.1	71.6	75.5	74.6	70.3	67.7	66.9	64.2	62.5	59.8	56.6	55.3	53.4	53.0	81.0
137	11-42	09/17/92	3-2	V	V		55*	43.9	45.4	52.8	71.6	56.0	61.8	64.8	62.5	72.4	77.0	78.7	75.1	73.7	75.2	75.5	75.5	75.2	74.1	71.8	69.1	67.1	63.1	59.7	53.6	86.2

Figure C-9. Heavy Trucks - Downgrade, Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	12-3	12/03/93	3-2	V			60	41.6	39.7	46.8	51.9	55.1	52.8	59.1	57.5	59.6	66.0	67.6	81.6	69.1	70.3	76.9	73.5	70.4	66.3	62.8	58.5	55.2	53.6	47.5	43.9	84.2
2	12-7	12/03/93	3-2	V	V		61	38.0	44.9	50.9	53.3	58.7	59.1	60.0	63.5	69.5	67.9	68.2	76.7	70.7	74.0	75.4	72.3	72.3	69.8	63.8	60.5	57.1	53.7	50.8	45.5	82.9
3	12-8	12/03/93	3-2	T	V		58	37.0	41.9	58.0	54.5	56.1	60.4	57.6	57.1	62.0	65.9	71.0	66.6	82.0	74.1	74.0	75.0	70.3	69.0	66.4	66.0	58.5	56.2	53.4	48.5	84.7
4	12-11	12/03/93	3-2	D	V		60	44.2	45.2	50.0	66.6	57.2	57.0	63.9	64.5	68.3	70.8	77.3	69.1	71.8	75.3	75.4	75.6	71.3	68.6	67.7	64.1	60.3	55.7	52.8	48.4	83.8
5	12-12	12/03/93	3-2	T	V		58	45.5	49.6	56.6	55.1	61.5	61.4	70.1	65.1	69.2	66.7	70.4	69.2	87.4	74.6	75.5	79.5	71.5	70.8	66.5	64.2	60.7	56.7	53.4	50.0	89.0
6	12-16	12/03/93	3-2	T	V		56	39.6	47.8	48.1	54.5	58.3	62.2	65.6	64.6	65.3	76.7	63.8	64.1	79.8	70.1	70.2	70.5	67.5	66.2	63.1	58.6	57.4	52.8	48.8	44.9	83.2
7	12-19	12/03/93	3-2	V	V		57	43.1	46.9	56.1	56.2	60.2	60.3	57.9	71.4	68.2	68.1	84.5	72.6	70.5	75.9	73.7	71.1	68.6	65.7	63.1	59.2	56.7	56.0	50.0	46.2	86.3
8	12-22	12/03/93	3-2	T	V		58	44.9	48.5	48.1	51.8	54.1	54.1	56.5	62.8	61.0	69.2	72.3	65.7	74.4	72.9	71.6	71.0	71.0	69.4	66.3	64.3	58.9	56.2	48.3	45.7	81.4
9	12-25	12/03/93	3-2	V	V		58	47.3	44.5	49.7	50.3	59.0	57.4	64.3	65.0	66.3	68.5	71.4	65.8	72.8	75.3	72.8	70.6	69.9	68.3	66.5	62.2	58.2	57.4	47.3	43.9	81.6
10	12-27	12/03/93	3-2	V	V		61	38.9	45.7	46.5	54.4	55.2	56.0	58.3	59.2	64.1	63.9	80.4	71.7	66.1	79.7	75.2	73.4	70.1	66.7	64.3	59.8	56.9	55.2	51.4	44.7	84.8
11	12-28	12/03/93	3-2	D	V		59	44.4	38.8	49.8	65.5	60.0	59.9	62.7	60.5	64.9	69.5	72.6	73.9	69.3	75.0	74.4	74.0	73.0	69.1	64.7	63.2	59.5	55.5	54.5	46.4	82.8
12	12-29	12/03/93	3-2	V	V		62	42.0	42.7	48.2	52.2	54.9	50.9	59.2	63.0	64.7	64.9	75.2	69.8	69.6	74.5	74.3	72.2	69.6	66.9	66.1	62.2	57.8	55.9	50.2	44.6	81.9
13	12-30	12/03/93	2-2	V	V		67	36.9	41.1	44.3	52.2	49.8	60.0	56.8	59.1	59.8	62.9	60.5	64.0	66.8	68.9	76.1	71.2	68.2	67.4	65.2	62.1	57.7	54.0	50.9	46.0	79.7
14	12-33	12/03/93	3-2	T	V		57	41.7	43.2	47.1	48.4	56.3	57.6	60.6	73.7	62.7	66.6	73.3	66.7	69.8	82.0	74.6	73.2	70.4	67.2	65.3	61.8	59.4	59.9	54.6	50.4	84.8
15	12-34	12/03/93	3	T	V		54	50.7	46.3	51.6	72.7	63.2	73.5	75.1	79.6	72.2	69.9	78.1	80.1	86.4	80.9	75.8	80.1	78.2	77.8	78.2	77.0	77.2	75.6	73.8	72.5	91.6
16	12-35	12/03/93	3-2	T	V		74	45.2	45.1	54.3	59.8	61.9	61.1	64.3	67.0	69.8	68.9	73.9	84.1	73.7	75.5	79.3	75.0	73.5	70.8	68.8	67.2	63.4	61.2	55.9	50.3	87.3
17	12-37	12/03/93	3-2	V	V		61	42.0	45.7	58.2	55.1	56.3	55.8	61.2	61.4	64.4	69.5	72.9	70.5	70.7	76.1	73.9	73.7	70.6	67.3	65.1	60.7	56.7	53.9	51.0	46.1	82.3
18	12-39	12/03/93	3-2	V			61	43.2	46.5	49.0	47.3	55.2	52.5	57.8	56.8	61.2	61.2	63.9	65.6	71.6	76.8	72.7	71.9	66.9	64.4	61.9	58.5	54.1	52.0	48.3	44.2	80.7
19	12-41	12/03/93	3-2	V			66	39.2	45.9	51.3	58.0	64.3	66.2	69.3	68.4	75.0	81.0	74.8	76.4	75.6	76.9	79.2	77.8	73.5	71.5	69.6	67.8	62.8	59.4	55.8	50.4	87.3
20	12-43	12/03/93	3	D			66	39.8	46.9	49.0	66.6	57.4	56.9	69.9	64.0	65.4	71.9	72.1	80.6	77.8	81.9	80.1	76.9	73.9	73.2	70.0	65.3	62.4	61.2	56.8	54.4	87.7
21	12-46	12/03/93	3-2	V	V		58	43.5	47.8	55.0	57.0	56.7	63.0	60.4	65.8	65.2	64.7	71.9	70.8	66.8	76.9	75.3	73.2	70.7	65.3	63.2	59.2	57.2	55.9	49.9	51.5	82.3
22	12-48	12/03/93	3-2	V	V		60	48.9	39.9	49.8	53.2	56.7	58.8	61.8	67.4	63.5	65.9	73.1	75.0	70.6	75.1	76.7	79.7	72.1	69.5	69.2	65.7	63.5	59.1	55.6	52.7	84.7
23	12-51	12/03/93	3-2	V	V		59	44.4	47.5	42.1	51.2	53.7	57.7	62.0	61.4	65.6	64.1	75.2	68.0	66.1	77.1	74.1	73.0	70.2	66.1	62.6	59.3	55.8	56.1	49.6	45.4	82.3
24	12-52	12/03/93	3-2	V	V		53	45.5	54.4	53.2	52.5	58.5	60.2	58.9	58.3	59.1	61.0	74.3	66.9	69.0	79.2	71.3	70.9	69.1	66.5	63.5	59.0	55.9	52.2	46.6	45.9	82.3
25	12-53	12/03/93	3-2	F	V	L	64	42.3	52.7	64.0	62.5	62.0	68.5	71.4	72.6	72.8	71.1	76.3	80.3	73.6	78.1	81.1	75.7	73.6	71.5	69.6	69.6	63.6	58.7	54.5	49.7	87.3
26	12-56	12/03/93	3	D	V		58	40.2	42.8	43.2	58.6	55.1	55.9	60.1	60.0	69.0	79.7	66.3	65.5	75.0	74.1	74.8	72.7	70.3	68.4	65.7	67.4	63.4	60.8	55.2	52.6	84.0
27	12-58	12/03/93	2-2	V	V		58	44.2	46.6	52.8	58.0	59.0	58.7	61.1	65.2	65.7	68.9	74.6	68.2	71.0	76.5	74.8	73.0	71.3	69.5	66.0	65.8	66.3	64.7	53.6	47.7	83.0
28	12-59	12/03/93	3-2	T	V		71	37.6	41.6	46.6	49.3	60.8	58.6	58.7	59.1	63.9	64.1	71.0	72.6	67.2	80.4	80.5	73.7	70.3	69.6	64.7	61.0	58.3	56.5	53.0	46.5	85.0
29	13-1	12/07/93	3-2	V	V		70	50.0	55.9	54.2	59.1	58.3	65.1	69.5	69.0	70.3	77.4	80.8	74.9	75.4	74.5	73.9	73.8	71.5	70.0	67.2	64.2	61.5	59.8	56.5	50.7	85.9
30	13-2	12/07/93	3-2	F	V	L	46	48.0	48.9	58.0	55.1	57.9	65.3	66.1	66.7	71.5	73.1	73.3	73.7	75.8	76.4	75.7	73.7	73.2	70.2	69.0	66.7	63.3	61.5	57.9	57.5	84.5
31	13-4	12/07/93	3-2	V	V		55	43.0	48.2	51.7	55.7	59.4	59.3	63.4	62.7	65.7	67.8	70.7	70.9	78.6	78.7	72.7	69.6	68.3	66.9	63.9	61.1	60.1	55.7	51.8	47.7	83.6
32	13-7	12/07/93	3-2	V	V		61	47.5	51.3	53.2	57.3	61.6	62.7	68.8	63.6	68.4	70.9	77.1	72.6	75.7	77.9	72.3	72.7	71.8	69.0	66.6	63.5	62.6	61.0	56.2	51.2	84.3
33	13-9	12/07/93	3-2	F	V	L	59	38.4	41.5	49.8	54.0	57.1	60.8	65.2	63.5	70.1	73.7	76.1	75.7	76.4	77.8	76.0	76.7	73.9	71.4	70.0	68.3	65.8	62.6	59.4	55.4	85.7
34	13-10	12/07/93	3-2	V	V		56	43.8	55.0	53.3	57.3	57.9	62.7	64.9	63.0	66.8	72.2	73.4	70.2	73.2	76.9	72.5	71.9	70.6	66.9	64.2	61.7	58.9	60.1	55.6	50.6	82.8
35	13-11	12/07/93	2-2	V			56	45.1	45.9	48.4	50.0	54.2	56.9	54.8	56.2	61.5	61.4	64.9	79.8	70.5	72.2	72.8	70.2	69.3	67.7	67.1	64.7	62.7	58.2	54.2	49.4	82.7
36	13-12	12/07/93	3-2	V	V		55	49.1	47.8	53.7	55.4	53.2	59.9	60.4	59.3	73.6	69.0	66.1	71.0	73.8	74.6	71.3	70.6	70.2	70.3	68.8	67.1	61.1	57.2	52.8	48.0	82.2
37	13-15	12/07/93	3-2	D	V		58	46.0	49.2	51.0	56.5	57.1	61.1	65.1	62.7	72.7	73.1	76.5	71.5	74.6	77.0	74.3	73.4	71.5	72.4	72.0	70.0	66.0	64.3	62.5	57.8	84.8
38	13-18	12/07/93	3-2	V	V		64	47.5	46.1	53.7	54.4	54.5	59.2	61.4	66.4	65.9	69.2	73.7	73.7	74.3	77.1	77.0	73.1	70.7	69.4	67.0	64.1	60.7	58.4	54.2	50.0	83.9
39	13-20	12/07/93	3-2	V	V		52	46.2	52.5	54.5	57.2	56.7	62.9	64.5	63.1	67.0	72.2	75.7	70.9	73.3	76.5	74.4	73.4	72.3	70.5	66.1	62.9	60.5	57.5	55.3	49.7	83.6
40	13-21	12/07/93	3-2	F		L	56	42.2	44.4	63.6	56.8	56.6	71.1	72.2	69.3	75.7	77.7	79.9	76.7	76.7	76.7	76.5	75.5	74.9	74.5	72.2	70.4	67.4	64.5	60.9	55.1	87.4
41	13-22	12/07/93	3-2	D	V		59	46.9	47.2	54.2	60.6	58.0	58.7	61.0	60.8	66.1	66.1	71.6	71.8	73.5	76.5	74.9	72.6	72.3	69.7	67.4	63.9	61.4	57.2	52.5	48.5	82.9

Figure C-9. Heavy Trucks - Downgrade, Controlled Access Roadways

(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	13-23	12/07/93	3-2	V	V		60	49.2	47.8	52.7	57.4	55.8	61.5	62.5	61.1	65.7	70.6	73.8	70.3	77.4	76.8	71.4	71.4	69.6	66.9	63.9	60.7	58.1	56.7	52.7	47.2	83.1
43	13-24	12/07/93	3-2	V	V		61	44.4	49.2	51.0	55.0	58.7	62.1	62.8	63.5	71.3	72.9	74.1	72.2	74.7	77.4	77.1	73.8	71.4	69.5	66.7	63.5	61.1	58.9	56.3	51.4	84.4
44	13-25	12/07/93	3-2	V	V		49	47.4	55.2	59.5	55.3	56.1	62.5	64.7	61.2	64.1	68.3	71.5	72.1	77.0	74.7	72.6	71.0	70.6	67.2	62.9	60.4	58.3	56.7	53.3	47.7	82.5
45	13-27	12/07/93	2-3	T	V		67	42.3	51.1	52.3	59.8	57.5	61.8	70.6	68.5	70.5	70.3	74.9	76.6	77.7	77.0	76.2	76.0	73.6	71.8	70.8	70.6	67.0	62.3	59.8	55.3	85.8
46	13-28	12/07/93	3-2	T	V		66	42.9	49.9	59.4	54.2	58.7	60.6	66.3	62.8	67.4	69.2	78.3	72.3	75.2	79.1	74.9	75.0	72.4	70.3	67.5	63.7	61.5	60.7	57.4	53.6	85.1
47	13-29	12/07/93	3-2	V	V		62	50.0	56.9	56.7	55.1	62.7	63.6	70.1	67.2	69.4	70.8	75.1	75.3	74.7	78.0	74.1	73.9	72.8	70.5	70.0	64.3	62.8	59.9	56.5	51.6	84.7
48	13-30	12/07/93	3-2	CC		L	61	41.6	51.8	58.7	59.2	60.8	62.3	66.9	63.0	73.2	69.4	71.2	81.2	77.0	78.6	76.6	74.7	74.0	71.5	70.9	69.3	67.3	63.8	60.1	55.5	86.6
49	13-32	12/07/93	3-2	V			57	45.3	52.6	62.0	58.1	60.4	65.2	69.8	62.1	67.2	72.2	75.4	74.0	75.8	75.3	74.4	74.0	73.2	73.6	69.6	70.1	67.3	67.2	63.3	60.2	84.8
50	13-33	12/07/93	2-2	F	H	U	61	43.4	48.3	49.5	60.8	59.8	63.1	65.7	65.6	65.1	69.6	71.2	71.8	70.4	72.5	72.9	72.9	72.7	70.8	69.1	66.1	63.1	60.2	56.7	52.2	82.2
51	13-34	12/07/93	3	F	V	L	58	39.3	45.4	51.9	54.0	58.1	61.6	62.8	59.6	73.4	74.1	77.5	70.5	71.4	72.9	72.3	69.8	69.2	65.3	63.3	61.8	59.8	59.6	57.9	55.6	83.0
52	13-37	12/07/93	3-2	V	V		63	44.6	52.0	56.2	57.3	58.8	59.4	64.9	64.0	77.7	68.1	75.9	70.5	73.9	78.8	74.8	72.3	72.4	71.2	68.0	65.7	62.2	58.4	54.3	49.3	85.0
53	13-38	12/07/93	3	T	V		64	46.1	44.6	49.0	56.5	53.6	61.1	61.7	60.4	66.7	70.3	76.9	73.4	74.0	75.1	75.4	74.9	73.3	71.6	69.6	67.4	65.5	61.6	59.0	54.6	84.3
54	13-41	12/07/93	3-2	V	V		57	50.8	54.9	55.1	57.2	57.9	59.2	66.2	66.6	67.6	67.3	74.1	72.1	76.6	74.4	72.1	71.0	70.3	66.8	64.2	62.3	59.8	58.7	57.2	51.1	82.7
55	13-43	12/07/93	3-2	V	V		63	44.3	45.7	47.9	55.9	57.5	63.4	64.1	60.7	67.6	71.2	78.2	76.4	74.0	75.0	71.5	71.2	71.4	67.5	65.8	64.1	62.2	59.1	55.3	51.8	83.9
56	13-45	12/07/93	3-2	V	V		57	44.2	44.6	52.2	57.1	57.9	60.3	60.5	61.3	64.7	72.2	72.7	70.4	73.3	72.7	71.6	70.0	69.2	67.1	65.6	66.7	67.2	62.5	59.5	53.4	81.7
57	13-46	12/07/93	3-2	D	V		59	49.3	50.5	57.4	66.0	65.0	66.3	65.5	65.4	68.2	72.2	73.1	73.0	77.0	75.6	76.2	73.9	73.1	72.3	69.7	66.1	64.0	61.2	58.2	53.9	84.6
58	13-48	12/07/93	3-1	D	V		83	46.3	50.6	51.5	53.3	54.4	59.5	63.9	64.0	72.7	72.1	72.7	75.6	75.8	75.1	74.9	73.3	73.4	71.4	69.3	66.7	63.7	62.3	56.4	51.9	84.3
59	13-49	12/07/93	3-2	F	V	U	68	44.5	45.1	49.4	56.3	57.4	59.2	63.2	63.0	65.9	66.8	73.9	71.4	75.2	75.7	75.2	74.2	71.9	70.3	67.8	63.9	61.3	58.8	56.1	49.5	83.4
60	13-50	12/07/93	3-2	V	V		64	46.4	47.1	51.9	52.5	56.8	59.1	61.8	59.3	64.6	65.6	73.9	71.8	72.2	75.8	75.7	73.4	73.9	70.9	67.5	65.7	63.7	59.9	56.5	51.9	83.3
61	14-1	06/24/93	3-2	F	V	L	60	42.8	45.3	55.1	51.3	56.0	58.7	58.2	59.4	61.7	64.5	78.2	76.0	74.4	74.1	69.6	70.3	68.0	65.8	62.5	60.9	60.2	56.3	52.6	47.7	83.0
62	14-3	06/24/93	3-2	CC			58	43.1	49.4	56.3	60.9	58.3	61.4	62.7	62.3	63.3	64.7	67.6	72.4	75.0	72.2	71.3	70.0	69.1	68.6	67.4	66.0	61.8	58.9	55.1	50.9	81.3
63	14-6	06/24/93	3-2	V	V		59	43.1	49.1	52.0	70.3	55.4	55.6	61.4	55.8	62.7	65.2	69.7	71.9	82.2	74.5	72.2	75.2	71.3	69.3	66.0	64.5	62.5	58.4	56.2	52.9	85.0
64	14-9	06/24/93	3-2	V	V		62	41.4	48.2	51.8	58.9	55.2	54.6	57.2	56.7	58.2	64.7	75.5	69.3	71.2	75.5	73.9	72.6	72.0	69.1	67.0	64.3	62.0	58.8	54.8	49.1	82.5
65	14-12	06/24/93	2-2	V	V		59	48.4	47.2	52.7	54.3	53.3	53.5	61.4	59.7	65.7	63.7	72.7	71.3	78.5	76.3	72.5	71.1	71.3	67.3	64.1	61.3	61.2	58.2	52.3	47.9	83.2
66	14-13	06/24/93	3	D	V		66	42.7	48.1	54.0	50.8	55.9	58.5	52.2	56.1	60.3	68.7	71.5	67.7	70.7	72.2	71.1	74.4	79.6	70.1	67.1	65.0	62.4	59.7	55.2	53.1	83.3
67	14-14	06/24/93	3-2	V	V		61	44.5	44.1	50.1	58.2	50.5	57.8	64.4	62.8	64.6	67.0	73.4	72.1	72.2	71.3	72.0	71.4	69.1	67.1	64.9	61.7	59.1	56.7	53.2	49.5	81.2
68	14-15	06/24/93	3-2	V	V		54	36.2	48.8	48.5	55.1	52.4	52.2	55.8	59.2	56.8	68.0	75.4	69.5	71.5	75.6	72.9	72.2	70.6	67.4	65.0	64.3	61.0	56.9	52.5	47.3	82.1
69	14-17	06/24/93	3-2	V	V		52	48.8	46.2	53.2	52.1	51.5	61.1	68.2	64.2	64.7	65.0	75.5	70.5	73.5	75.0	72.6	71.4	70.1	69.0	65.3	63.0	60.6	57.5	54.0	49.0	82.4
70	14-18	06/24/93	3	G	V		66	49.0	42.1	48.8	61.9	57.5	56.2	60.9	60.6	64.3	75.3	70.3	68.6	73.4	72.4	75.2	75.0	71.4	68.8	68.1	66.1	60.8	57.4	53.2	52.0	83.0
71	14-19	06/24/93	4	CM	V		53	39.7	48.1	54.7	58.8	58.0	61.7	62.7	66.3	63.2	80.8	69.3	69.3	73.6	73.4	74.6	73.5	72.6	71.1	68.4	65.4	62.8	59.8	56.8	51.4	84.6
72	14-20	06/24/93	3-2	V	V		62	48.3	56.0	51.0	48.9	57.9	55.9	61.8	65.0	68.0	68.6	68.0	73.0	76.0	73.3	71.4	73.2	69.9	70.3	65.7	61.9	59.5	55.9	50.1	46.8	82.3
73	14-21	06/24/93	3-2	V	V		61	40.0	48.1	58.6	63.0	55.6	56.4	58.7	60.1	65.2	72.0	82.4	70.5	71.7	74.8	73.3	71.0	71.0	68.7	66.7	63.5	61.2	57.9	53.9	53.0	85.0
74	14-25	06/24/93	3-2	V			61	45.6	48.2	46.5	48.4	55.9	55.6	57.7	60.3	63.1	66.9	73.5	70.4	71.3	72.3	70.2	68.6	69.0	66.7	65.2	61.9	58.5	56.1	52.8	48.8	80.4
75	14-26	06/24/93	3	D	V		59	38.7	50.5	48.6	51.8	69.1	56.7	61.3	54.0	59.4	63.9	63.7	71.2	76.0	74.0	71.6	75.2	70.0	69.7	66.1	62.1	60.2	57.8	54.1	49.6	82.3
76	14-28	06/24/93	3-2	V	V		54	49.4	48.8	53.8	58.5	59.8	55.0	58.3	59.7	64.4	66.4	70.5	69.7	74.4	71.2	69.3	70.0	68.9	67.3	64.3	62.6	60.2	59.3	56.4	55.8	80.5
77	14-29	06/24/93	3	F	V	U	55	43.8	53.2	48.9	56.3	55.6	61.1	59.7	58.9	60.1	68.4	71.0	76.8	75.4	73.0	70.4	69.8	67.8	65.1	61.8	60.2	58.6	55.2	51.9	48.8	82.1
78	14-31	06/24/93	3-2	F	V	U	54	41.2	42.1	48.2	51.0	49.4	51.4	59.3	55.6	55.5	61.4	79.5	70.5	67.9	75.1	72.2	70.3	67.5	66.0	62.3	59.6	56.4	54.0	50.0	45.8	82.6
79	14-33	06/24/93	3-2	F	V	L	52	43.7	47.6	51.1	57.0	58.5	64.7	68.6	60.1	64.1	62.7	69.2	75.7	80.3	76.7	73.9	72.2	69.8	69.2	65.9	63.3	60.2	57.9	54.7	51.3	84.5
80	14-35	06/24/93	3-2	U	V		58	40.4	48.3	54.2	51.9	56.1	57.6	72.3	73.3	63.6	70.6	73.2	72.2	72.2	75.2	71.0	70.5	70.9	68.7	68.2	67.7	66.8	61.7	55.1	51.8	83.1

Figure C-9. Heavy Trucks - Downgrade, Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
81	14-37	06/24/93	3-2	F	V		55	35.8	40.8	49.2	49.7	56.0	55.2	59.6	61.3	61.7	73.6	69.9	69.3	72.2	74.5	72.6	71.0	71.5	68.1	64.0	62.9	60.1	57.0	52.5	50.8	81.7
82	14-38	06/24/93	3-2	V	V		52	44.9	46.6	48.3	55.5	54.6	60.3	65.6	63.8	64.0	65.3	72.6	73.4	74.4	77.7	76.1	73.3	72.7	72.3	70.4	67.6	65.2	60.3	55.5	50.3	84.1
83	14-40	06/24/93	3-2	V	V		64	45.6	49.2	49.6	52.4	56.3	58.3	60.5	62.1	64.9	65.3	76.2	72.5	73.5	75.7	73.7	75.4	79.3	69.9	69.0	62.6	59.6	56.5	52.7	48.1	84.7
84	14-41	06/24/93	3	D	V		61	45.4	42.6	58.5	51.0	54.2	58.4	56.3	57.8	65.5	69.5	68.7	72.8	68.7	68.9	72.1	68.4	68.0	65.5	62.3	59.9	57.6	56.7	52.8	49.5	79.7
85	15-3	8/11/94	3-2	CC			53	37.8	40.8	47.5	57.1	51.5	58.3	59.1	65.1	58.8	65.4	68.9	71.3	73.1	74.1	70.3	68.4	68.6	67.5	66.3	64.1	62.1	61.6	58.9	54.8	80.7
86	15-4	8/11/94	3-2	V	V		56	48.2	45.5	51.6	53.6	56.0	57.0	57.5	67.5	61.0	64.7	69.5	68.5	67.5	70.1	68.6	68.2	67.4	64.9	62.7	59.4	57.1	56.0	53.0	47.2	78.5
87	15-7	8/11/94	3-1	D	V		56	48.1	39.6	60.7	60.8	52.5	53.2	58.1	56.4	61.6	65.6	69.1	68.6	70.5	73.5	68.1	67.5	65.9	63.4	60.1	59.5	59.9	58.7	56.2	54.6	79.1
88	15-8	8/11/94	3-2	V	V		59	50.9	50.3	56.7	58.4	54.0	52.0	54.5	57.3	61.2	63.2	71.4	67.5	67.9	74.0	69.8	67.2	67.6	63.4	62.6	61.9	60.8	63.0	61.1	59.5	79.5
89	15-9	8/11/94	3-2	T	V		58	44.0	42.0	53.6	62.9	56.3	57.4	58.9	59.2	63.5	66.1	71.8	70.9	71.9	73.5	71.4	69.9	67.8	67.3	64.5	63.1	60.6	57.0	57.0	50.6	80.7
90	15-14	8/11/94	3-2	V	V		65	51.1	48.4	55.8	58.0	56.8	58.4	61.9	64.8	66.9	69.4	70.3	74.0	75.1	74.0	72.6	69.8	69.0	67.6	65.2	62.0	60.7	58.7	54.6	50.8	82.1
91	15-18	8/11/94	3-2	V	V		56	50.3	48.5	65.5	57.1	57.2	61.6	61.2	61.4	64.4	70.7	75.3	72.5	71.8	73.3	70.6	71.2	68.9	69.5	66.8	66.4	65.9	66.5	61.6	60.1	82.4
92	15-19	8/11/94	3-2	V	V		62	49.9	52.4	52.7	55.6	54.7	55.8	61.8	61.0	66.2	65.0	70.0	72.1	74.3	74.9	69.7	68.3	66.3	65.4	62.4	59.4	57.7	55.3	52.9	49.5	80.9
93	15-20	8/11/94	3-2	FB	V	U	57	37.1	47.9	46.2	55.2	55.5	51.5	58.6	62.1	65.3	65.2	68.9	70.2	70.0	71.2	70.5	68.9	66.9	64.1	62.2	58.9	56.6	55.2	51.4	47.9	79.1
94	15-26	8/11/94	3	FB	V	L	59	33.8	36.5	43.9	50.6	52.2	49.0	49.3	54.5	60.4	64.3	65.9	68.1	77.0	69.9	71.3	69.6	66.6	66.1	62.5	59.5	56.7	53.3	51.3	47.6	80.4
95	15-27	8/11/94	3-2	V	V		57	52.6	54.5	54.9	61.3	61.1	58.0	62.5	61.9	63.1	66.3	76.4	71.3	74.5	73.4	70.7	69.4	68.4	67.7	64.3	61.7	60.4	58.6	54.0	49.6	82.0
96	15-29	8/11/94	2-2	CC			55	33.8	44.9	47.9	54.1	54.7	52.5	56.7	56.4	59.2	62.3	70.3	68.2	67.7	68.6	68.5	68.8	69.2	68.1	65.7	64.1	62.9	61.8	57.8	54.7	78.7
97	15-30	8/11/94	3	TR	V		59	35.3	44.8	49.6	54.0	57.4	54.2	58.9	58.2	60.1	65.2	73.1	68.6	68.4	70.0	69.1	68.5	68.1	69.3	66.6	64.1	61.1	59.9	57.0	53.3	79.6
98	15-34	8/11/94	3-2	V	V		55	44.0	44.4	51.2	53.3	55.5	55.9	56.9	55.5	60.6	64.6	66.9	67.5	69.2	73.3	70.1	67.1	66.3	63.7	63.2	59.2	57.1	59.3	50.9	46.1	78.6
99	16-1	8/3/94	3-2	V	V		52	37.8	42.3	52.6	54.1	51.9	61.5	60.3	63.5	68.3	70.0	70.7	70.6	69.8	70.5	77.4	69.5	68.6	67.3	64.3	61.5	59.0	57.5	54.5	51.8	81.7
100	16-2	8/3/94	3-2	FB	V	L	58	33.1	36.9	58.9	48.4	53.2	53.4	58.5	58.8	64.5	64.4	76.3	67.1	69.0	71.7	69.1	66.7	67.1	62.7	62.0	59.5	57.3	56.3	55.0	51.0	80.1
101	16-4	8/3/94	3-2	V	V		59	39.3	52.6	57.7	56.3	56.3	56.9	63.3	60.7	61.8	64.0	74.4	72.2	70.3	69.5	68.8	69.2	67.3	64.8	64.3	61.1	58.7	56.9	56.3	49.4	80.2
102	16-5	8/3/94	2-1	V	V		56	37.7	47.1	46.5	48.8	51.5	54.4	53.0	56.5	57.2	69.8	73.3	66.4	67.3	69.5	66.9	66.7	65.5	62.8	59.5	59.2	53.8	52.9	48.6	45.0	78.4
103	16-6	8/3/94	2-2	V	V		56	41.3	44.1	55.7	57.8	52.1	59.1	60.1	62.2	62.0	60.0	61.8	79.1	72.1	68.1	67.0	64.1	64.2	63.1	60.1	56.1	52.9	51.7	49.3	44.1	81.0
104	16-7	8/3/94	3-2	V	V		49	37.3	37.4	49.6	48.8	50.6	52.8	58.0	53.5	58.9	62.2	73.3	71.2	64.5	68.5	69.5	67.5	64.5	65.4	62.9	61.3	57.5	55.0	49.6	45.8	78.7
105	16-8	8/3/94	3-2	V	V		56	36.2	40.1	51.2	46.9	45.3	55.3	52.5	57.8	54.7	60.9	72.0	78.1	67.7	71.7	76.0	69.4	68.5	65.6	61.4	59.3	56.8	57.0	51.9	46.5	82.2
106	16-9	8/3/94	3-2	T	V		56	41.8	44.2	67.2	49.3	56.5	67.9	65.1	66.0	65.0	69.2	78.9	75.6	71.6	77.3	71.5	72.0	70.1	66.6	64.1	62.9	60.3	58.2	55.0	55.0	84.2
107	16-10	8/3/94	3-2	V	V		59	40.1	44.0	49.1	53.2	52.3	58.1	57.1	57.4	59.6	63.7	74.4	69.4	65.7	71.9	70.9	67.9	67.2	63.6	61.1	58.5	54.9	52.4	48.9	46.5	79.5
108	16-11	8/3/94	3-2	V	V		52	34.9	38.8	62.5	48.4	47.6	59.1	62.7	58.2	72.8	72.4	70.5	66.9	69.0	66.2	67.3	66.2	64.0	61.4	60.0	59.0	58.3	57.0	54.6	54.2	79.4
109	16-12	8/3/94	3	D			62	33.5	42.6	44.9	63.0	61.3	55.0	58.1	59.3	75.0	81.2	67.7	68.3	70.8	70.2	69.8	69.4	65.8	65.5	63.9	61.9	59.8	57.2	55.2	52.7	83.7
110	16-13	8/3/94	3-2	V	V		57	42.6	46.8	64.2	52.5	53.5	58.7	55.5	55.9	64.0	64.2	75.7	71.5	71.3	70.5	68.7	67.3	65.2	62.6	60.7	59.3	57.5	55.6	51.6	48.6	80.3
111	16-14	8/3/94	3	D	V		51	34.3	39.1	50.4	51.6	61.8	54.7	58.0	60.1	71.2	84.0	69.6	69.2	72.2	71.7	69.7	70.5	68.6	66.6	64.7	62.8	59.5	56.9	55.2	52.8	85.5
112	16-15	8/3/94	3-2	T	V		56	35.8	43.2	47.7	52.9	56.0	58.0	55.8	56.4	57.5	61.6	75.1	66.9	68.7	72.6	66.8	66.8	64.8	62.0	60.0	57.5	54.9	53.4	48.5	45.2	79.2
113	16-16	8/3/94	3-2	V	V		52	50.1	47.1	54.1	59.7	54.7	54.6	60.7	58.4	58.8	62.4	67.4	70.5	70.4	70.0	68.7	66.8	67.3	65.0	63.3	60.3	57.5	55.3	50.6	46.4	78.4
114	16-17	8/3/94	4		V	L	49	40.3	44.0	64.3	48.8	55.7	65.1	52.0	54.7	58.5	81.3	68.4	63.9	71.3	72.1	70.1	69.6	68.2	66.1	64.7	64.0	60.2	59.4	56.4	51.3	83.4
115	16-18	8/3/94	3-2	V	V		47	41.1	45.6	48.1	55.9	54.5	57.7	59.5	54.0	62.6	68.6	73.2	66.1	68.2	69.2	67.5	66.6	65.7	64.1	59.9	58.3	56.1	56.3	50.2	46.8	78.5
116	16-20	8/3/94	3-2	D	V		52	40.8	45.8	58.2	50.8	54.4	57.0	57.4	59.2	58.2	67.0	68.2	70.7	66.7	71.4	69.8	68.2	66.6	63.7	60.6	57.5	54.7	52.1	48.4	45.0	78.5
117	16-21	8/3/94	3-2	V	V		51	40.6	43.6	48.8	49.1	51.3	53.8	52.2	53.9	56.7	57.2	59.7	63.2	69.7	67.0	64.8	64.2	63.6	61.9	60.2	56.2	53.2	53.0	48.3	43.9	74.9
118	16-22	8/3/94	3-2	V	V		55	42.7	41.8	61.6	50.9	55.6	61.2	58.6	65.6	59.9	66.6	76.0	69.1	68.2	73.1	70.9	72.0	67.4	65.5	64.8	63.4	61.1	60.7	57.2	52.1	81.3
119	16-23	8/3/94	2-1	V	V		49	40.6	42.5	51.4	65.5	54.9	54.4	56.4	57.7	59.1	75.4	71.2	66.3	66.4	67.4	66.6	65.6	64.3	62.8	62.1	57.8	56.0	55.1	52.4	48.7	79.2

Figure C-9. Heavy Trucks - Downgrade, Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
120	16-24	8/3/94	3-2	V	V		55	41.9	41.6	62.0	53.5	52.6	58.3	57.8	56.8	64.1	65.6	82.5	70.8	70.8	71.8	68.7	71.2	68.6	67.9	66.2	61.3	60.6	57.5	55.0	52.0	84.3
121	16-26	8/3/94	3-2	V	V		49	42.6	43.9	51.0	55.7	60.6	57.8	57.3	56.5	61.9	59.8	62.6	64.9	66.0	68.7	65.4	66.5	64.3	61.8	59.7	55.5	52.9	53.3	52.0	43.3	75.6
122	16-28	8/3/94	3-2	V	V		58	33.3	43.9	61.6	53.4	60.7	57.3	63.9	57.2	62.5	65.7	74.9	73.4	67.6	69.9	69.0	67.8	65.7	63.3	60.7	58.0	54.6	52.5	48.9	45.9	80.1
123	16-29	8/3/94	3-2	V	V		55	43.1	41.6	54.1	58.1	51.9	53.9	59.0	56.2	58.4	58.7	68.1	70.2	71.8	70.7	70.2	70.1	68.9	67.8	64.5	61.5	58.3	55.7	53.0	48.3	79.4
124	16-31	8/3/94	3-2	V	V		64	48.9	49.2	67.9	58.5	59.0	68.7	63.9	65.4	66.6	66.7	74.2	70.4	71.1	73.4	70.7	71.0	71.8	75.6	72.8	73.1	69.6	69.1	66.9	62.6	83.8
125	16-32	8/3/94	3-2	V	V		53	36.4	40.7	47.2	54.4	57.1	62.3	61.9	64.1	61.0	61.0	66.2	66.4	67.3	69.9	71.6	67.8	66.7	71.0	63.2	60.6	58.1	54.2	54.1	49.0	78.8
126	16-33	8/3/94	3-2	V	V		57	48.9	40.3	46.0	59.0	57.9	56.2	56.1	57.6	58.5	62.4	64.5	71.6	69.9	71.4	69.7	69.2	67.7	66.0	62.8	61.0	58.7	58.1	62.1	49.9	79.0
127	16-35	8/3/94	3-2	V	V		54	35.4	41.8	49.6	58.5	58.1	58.4	66.9	63.7	60.5	64.7	73.1	74.6	67.1	73.0	73.6	70.7	68.0	65.0	62.4	59.5	56.9	58.0	50.2	46.9	81.3
128	16-37	8/3/94	3-2	V	V		57	43.3	43.8	58.0	51.5	50.6	56.5	56.1	59.3	57.9	60.3	72.0	68.4	73.7	69.7	65.9	64.2	63.3	62.7	59.3	55.5	52.4	49.7	46.4	42.2	78.6
129	16-38	8/3/94	3-2	V			51	44.4	41.7	54.6	52.6	54.0	52.4	57.0	56.6	67.8	66.1	68.5	73.2	68.4	67.8	68.0	66.2	66.8	64.4	61.7	58.6	55.7	54.2	52.3	46.6	78.7
130	16-39	8/3/94	2-2	V	V		59	44.0	46.7	50.1	64.9	55.8	60.4	56.1	55.7	66.3	65.8	62.7	69.4	71.9	70.1	69.1	67.4	67.6	64.2	62.6	60.0	56.8	62.2	51.9	47.6	78.9
131	16-41	8/3/94	3	TR	V		56	32.4	37.6	51.3	51.0	52.8	56.4	52.7	51.7	57.7	58.7	73.8	73.7	65.9	66.9	67.0	66.8	64.7	62.6	59.2	57.0	54.8	51.9	52.0	47.3	78.8
132	16-43	8/3/94	3-2	V	V		55	44.3	48.6	49.6	53.7	50.5	52.1	54.3	56.3	64.5	66.0	68.2	74.3	70.9	69.8	70.4	67.3	65.8	64.4	61.4	59.0	58.4	65.5	52.1	47.3	79.7
133	16-45	8/3/94	3-2	V	V		53	42.1	35.7	57.6	51.6	55.7	58.3	60.6	58.3	61.0	62.3	72.0	69.8	67.1	69.0	65.8	65.3	63.6	60.5	57.1	53.9	52.6	53.6	47.2	44.3	77.6
134	16-47	8/3/94	3-2	V	V		53	37.3	44.9	45.9	47.0	52.8	54.7	55.1	54.7	55.8	61.9	73.6	72.4	69.2	68.6	69.0	68.5	65.8	64.9	62.6	59.7	56.9	53.5	48.2	44.2	79.3
135	16-48	8/3/94	3-2	V	V		53	38.6	43.3	52.9	55.3	51.7	52.8	55.2	55.9	61.2	62.5	69.3	63.4	66.9	68.2	66.6	68.3	65.5	62.0	59.4	55.9	53.0	51.5	48.4	43.8	76.5
136	16-49	8/3/94	3-2	V	V		53	36.5	40.2	52.1	53.6	53.5	57.5	68.3	66.4	68.1	65.2	79.5	73.3	69.2	69.7	69.6	67.7	67.0	63.8	61.5	57.5	55.2	51.8	48.7	44.3	82.4
137	16-50	8/3/94	3-2	V	V		55	44.3	41.8	47.9	49.0	58.9	56.5	52.9	56.5	58.9	62.0	72.0	75.4	69.7	71.4	69.5	67.8	67.1	63.7	62.5	62.3	59.1	61.5	60.0	46.8	80.3
138	16-51	8/3/94	3-2	V	V		55	39.4	40.8	49.0	51.5	53.8	51.9	56.8	59.5	57.9	57.5	64.8	72.4	66.2	70.1	68.3	65.3	65.5	65.3	62.9	63.0	58.8	56.7	55.0	46.4	77.8
139	16-52	8/3/94	3-2	V	V		50	50.2	45.4	49.7	49.9	51.6	56.8	59.2	56.7	61.7	70.6	65.5	73.9	70.4	67.7	66.6	66.2	65.6	62.5	59.6	58.0	54.7	54.3	51.3	44.6	78.9

Figure C-10. Heavy Trucks - Level, Non-Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAXA
1	17-3	12/18/92	3-2	?	V		52	46.8	45.4	50.1	68.3	57.1	58.3	64.3	68.0	77.7	74.6	72.0	74.3	72.3	73.3	70.4	70.9	75.0	73.2	70.3	72.8	66.5	61.0	61.3	54.4	84.8
2	17-11	12/18/92	3-2	?	V		54	38.6	49.3	44.3	57.8	53.3	56.3	62.6	56.9	59.1	65.1	76.3	67.1	66.9	76.5	71.5	70.8	68.2	66.7	64.8	61.0	58.0	56.4	51.2	50.9	81.7
3	17-12	12/18/92	3-2	V	V		53	43.6	47.8	63.7	52.6	58.0	59.5	58.7	60.9	62.3	66.8	72.6	68.0	69.0	72.2	70.7	69.2	67.8	66.9	65.0	64.1	59.1	56.3	52.9	48.6	80.0
4	17-15	12/18/92	3-2	V	V		61	45.3	46.8	71.7	52.5	57.9	68.0	59.6	65.7	70.7	69.1	68.9	69.6	75.8	74.7	71.4	72.1	73.1	67.0	70.4	70.7	65.7	70.7	64.3	55.0	83.6
5	17-17	12/18/92	3	CM	V		40	37.9	38.0	55.9	46.9	46.6	51.0	58.6	57.1	71.4	61.8	62.7	64.9	68.1	69.7	67.9	70.5	67.3	64.4	61.3	62.2	59.0	55.0	49.7	45.2	78.3
6	17-24	12/18/92	3-2	?	V	L	43	39.3	46.5	55.0	68.7	54.6	62.6	70.9	65.5	63.1	73.8	72.1	65.1	71.6	71.1	68.5	68.5	67.9	67.2	65.1	64.4	61.5	59.7	62.7	60.6	81.3
7	17-27	12/18/92	2-2	V	V		49	39.0	44.3	47.2	53.0	51.3	60.7	62.0	60.6	58.7	61.9	65.4	61.7	65.5	72.2	72.5	68.7	66.0	66.9	62.1	61.6	57.5	54.1	51.0	48.3	78.5
8	17-34	12/18/92	2-1	V	V		52	38.1	43.0	51.5	52.0	63.0	53.4	57.5	60.0	58.0	63.5	73.8	61.6	68.6	69.1	66.4	66.4	65.6	66.4	63.5	63.3	60.5	55.9	53.8	49.8	78.5
9	17-35	12/18/92	3	D	V	L	51	42.2	41.5	52.4	52.3	55.6	56.7	58.2	64.7	75.1	70.7	62.6	67.5	68.7	70.4	69.0	71.0	69.9	67.2	62.7	59.4	55.7	53.0	49.9	45.6	80.6
10	17-36	12/18/92	3-2	F	V	L	52	42.1	41.4	55.9	52.2	54.5	68.7	64.5	61.4	68.4	74.7	68.4	67.9	70.2	72.9	73.6	72.0	81.4	67.8	65.1	63.0	58.5	54.4	51.6	47.8	84.5
11	17-41	12/18/92	2-2	?	V	L	52	42.4	42.6	54.9	49.2	55.3	57.5	54.7	55.3	58.3	60.3	62.4	61.4	62.5	63.5	65.2	63.6	62.9	60.8	58.3	56.0	54.4	50.0	46.6	43.1	73.3
12	17-43	12/21/92	3-1	D	V		59	43.9	43.0	48.0	54.9	56.7	56.4	62.6	66.1	64.1	65.0	65.8	67.1	68.6	70.4	70.6	73.1	68.4	68.1	66.3	62.8	59.5	57.1	54.7	53.8	79.7
13	17-47	12/21/92	3-2	T			52	41.9	43.1	52.5	51.4	57.6	54.8	56.3	54.3	60.8	59.9	72.3	65.5	69.5	75.0	71.0	67.6	67.0	64.8	61.3	59.5	60.2	53.3	50.2	47.3	79.8
14	17-51	12/21/92	3	D			51	38.2	42.5	54.4	51.4	55.6	60.3	55.6	57.5	58.8	69.9	62.0	64.0	68.8	72.2	68.3	68.8	67.7	66.1	61.5	62.5	57.6	54.8	53.0	48.7	78.5
15	17-52	12/21/92	3	D	V		52	42.1	44.2	65.3	49.5	53.1	61.5	56.5	57.6	60.4	66.3	66.6	71.4	68.5	68.3	71.1	71.2	71.7	67.7	63.9	61.6	59.7	55.7	56.1	46.6	79.8
16	17-53	12/21/92	3	D	V		68	44.4	51.2	52.8	67.5	56.4	61.8	61.9	62.2	64.3	62.3	71.7	79.0	70.8	73.0	72.8	71.6	70.1	69.1	65.5	62.5	59.6	57.0	58.9	54.2	83.1
17	17-54	12/21/92	3	CM			43	37.7	41.3	54.4	56.3	49.0	53.2	64.4	56.5	65.7	65.7	58.5	63.0	70.2	71.7	69.5	72.4	68.1	65.3	61.6	61.5	59.8	57.5	52.2	49.0	79.0
18	17-60	12/21/92	3-2	V			61	45.2	45.5	49.2	52.8	55.4	60.7	60.1	64.7	65.9	64.1	66.3	68.5	72.6	74.7	68.8	67.6	65.4	63.4	60.1	56.8	54.8	52.9	49.1	45.3	79.7
19	17-61	12/21/92	3-2	V			52	39.8	47.6	55.4	57.3	54.8	55.8	57.4	58.0	61.2	65.3	61.7	67.0	73.5	69.2	68.8	66.0	64.7	64.3	63.8	61.4	56.2	54.2	52.5	52.5	78.3
20	17-63	12/21/92	3-2	D			50	45.5	44.8	42.8	56.0	56.2	56.1	63.9	61.8	65.3	70.1	69.8	65.6	71.5	73.0	68.4	68.3	68.1	64.0	63.8	61.8	58.1	53.8	50.3	47.8	79.7
21	17-66	12/21/92	3-2	V			48	38.7	45.4	48.1	55.5	47.4	50.1	54.5	56.9	58.1	62.7	61.3	60.0	67.3	67.3	69.0	65.9	63.2	62.0	59.1	55.4	52.3	49.5	46.6	43.3	75.3
22	17-68	12/21/92	3-2	V			56	50.8	49.8	58.0	57.7	59.3	66.7	61.0	59.1	63.7	62.4	71.8	68.9	67.4	70.7	71.2	70.2	68.6	66.9	63.4	58.9	57.0	54.6	55.5	49.4	79.7
23	17-69	12/21/92	3-2	V			41	44.6	47.7	45.6	65.2	49.8	54.4	57.3	54.3	62.2	69.2	62.6	61.9	68.2	69.4	68.9	68.8	67.4	63.9	60.6	61.8	57.5	52.6	50.2	46.6	77.8
24	17-72	12/21/92	2-2	V			51	40.8	45.6	63.4	49.8	53.5	57.7	53.1	54.5	58.3	62.5	63.7	64.0	68.3	71.0	73.4	69.7	73.9	76.6	72.4	67.2	61.3	57.0	53.6	51.7	81.9
25	17-75	12/21/92	3-2	D			54	43.2	41.4	45.8	47.7	53.3	53.5	55.2	59.1	61.8	68.3	70.0	65.2	68.5	70.7	69.2	68.0	66.2	66.5	62.9	61.4	58.4	60.0	52.3	48.6	78.5
26	17-76	12/21/92	2-2	V			45	41.7	45.7	55.2	50.3	51.8	53.7	53.5	57.1	57.8	57.4	60.1	61.5	66.1	67.6	69.5	66.1	65.5	65.2	61.8	59.2	56.6	52.1	49.0	47.7	75.8
27	17-77	12/21/92	3	F			46	39.8	41.3	44.3	47.0	54.3	49.1	50.4	59.7	59.5	67.2	68.8	65.4	65.0	71.2	70.1	64.8	64.0	62.8	60.3	56.2	55.2	52.0	46.5	47.5	77.4
28	19-1	11/18/93	3-2	V	V		45	42.8	56.3	54.0	55.3	57.7	57.9	57.8	56.9	64.5	69.5	69.7	70.6	71.5	72.1	67.8	67.6	67.5	65.9	62.7	62.5	57.8	55.6	54.0	50.0	79.7
29	19-2	11/18/93	3-2	V	V		48	47.0	52.5	48.8	61.3	54.9	59.5	63.5	65.5	65.1	62.4	64.8	70.7	74.8	73.0	70.9	71.3	70.6	67.3	65.0	60.1	57.0	56.5	52.8	49.3	81.0
30	19-3	11/18/93	3-2	V	V		43	37.8	49.1	50.9	59.1	61.1	71.7	65.3	69.5	69.6	74.3	68.7	73.0	74.6	74.4	73.6	74.5	72.3	72.1	74.8	71.9	68.0	66.2	64.4	58.6	84.7
31	19-4	11/18/93	3-2	F	V	L	44	36.5	42.4	66.7	47.9	57.4	64.7	59.2	69.2	62.4	67.3	73.8	70.4	71.2	72.0	70.6	69.5	68.1	66.1	63.8	61.3	58.0	55.9	54.1	50.9	81.0
32	19-6	11/18/93	3-2	FS	V		42	42.6	44.2	57.7	78.3	63.6	62.3	67.8	67.8	70.2	79.4	83.5	80.3	75.4	79.3	80.3	84.7	86.2	81.6	80.3	77.0	74.1	71.2	64.8	58.0	92.5
33	19-8	11/18/93	3-2	F	V	U	46	45.4	40.5	60.7	50.7	54.1	60.9	62.0	64.2	68.3	66.5	64.7	68.2	69.8	72.1	70.5	68.9	68.5	67.7	69.0	70.1	64.8	58.5	57.7	49.8	80.3
34	19-9	11/18/93	3-2	V	V		38	41.8	48.4	59.0	54.5	54.3	58.7	58.4	60.8	77.2	70.8	64.8	66.7	68.1	69.0	65.4	68.0	66.0	64.9	61.5	58.8	55.8	53.3	51.5	55.0	80.5
35	19-10	11/18/93	3-2	V	V		54	43.6	49.8	52.5	61.0	54.7	57.7	64.5	68.3	65.0	65.3	71.0	71.4	74.3	75.4	71.0	68.9	69.7	66.3	64.7	63.0	60.5	57.3	55.8	51.2	81.7
36	19-11	11/18/93	4	D	V		40	42.6	45.2	61.2	53.6	50.9	62.0	58.5	64.4	78.3	71.7	64.4	66.8	71.3	73.0	68.5	69.8	69.5	66.5	65.0	65.9	60.8	57.2	53.8	50.6	82.3
37	19-13	11/18/93	3-2	D	V		47	46.2	50.7	51.6	69.0	61.0	66.5	64.1	71.1	68.6	71.8	71.7	70.1	74.3	72.8	71.7	71.6	71.3	68.7	67.3	66.0	62.7	60.5	57.3	51.9	82.7
38	19-17	11/18/93	3-2	V	V		55	41.1	49.5	52.2	63.7	58.2	60.2	62.6	62.5	64.5	68.2	73.2	74.3	73.2	75.2	72.4	70.8	69.9	70.8	66.7	65.6	63.1	60.4	58.1	52.8	82.6
39	19-18	11/18/93	2-2	V	V		54	46.4	50.8	50.6	66.8	55.3	59.9	62.0	57.8	61.1	66.6	65.9	68.8	69.4	71.7	70.2	69.5	68.8	66.0	63.6	62.0	60.1	58.1	57.0	53.8	79.4
40	19-20	11/18/93	3-2	V	V		53	44.2	44.1	65.1	57.4	60.3	73.2	61.7	70.9	69.6	68.9	70.6	71.9	76.3	77.2	73.6	73.7	74.0	72.1	70.9	68.6	64.4	61.8	61.1	54.7	84.6
41	19-21	11/18/93	2-2	V	V		43	43.7	51.9	59.1	63.3	57.9	62.5	62.5	61.1	66.2	66.0	67.8	70.5	73.8	73.1	72.4	72.0	73.9	73.8	70.7	65.2	61.8	59.3	55.5	52.1	82.5

Figure C-10. Heavy Trucks- Level, Non-Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	19-24	11/18/93	3-2	V	V		51	38.4	53.6	62.7	53.6	52.0	61.2	59.2	59.9	64.1	61.0	68.2	70.0	72.9	74.3	69.0	68.4	68.1	67.0	61.0	58.4	55.5	53.2	49.2	48.5	80.1
43	19-25	11/18/93	3-2	D	V		52	46.4	45.2	63.6	55.2	63.6	63.1	63.1	66.9	65.4	62.2	65.5	67.5	71.8	70.9	66.6	68.5	73.9	65.8	64.2	68.0	57.8	56.6	50.7	48.6	80.2
44	19-27	11/18/93	2-2	F		U	43	47.7	41.5	49.4	48.8	66.7	71.2	58.0	62.2	63.2	64.5	61.4	64.3	68.1	71.9	73.0	70.9	69.3	68.1	63.6	60.7	58.8	55.9	53.2	47.9	80.2
45	19-28	11/18/93	3-2	V	V		46	48.9	45.3	56.9	52.9	59.2	60.1	58.1	58.7	62.9	63.7	61.0	65.0	67.2	67.7	67.4	66.6	65.7	63.2	81.7	63.2	55.7	70.2	50.3	53.6	83.1
46	19-30	11/18/93	3	CM	V		43	43.1	42.1	44.7	58.7	53.6	58.4	62.8	68.6	69.1	65.0	69.0	69.2	69.0	73.7	72.1	71.6	72.5	71.1	67.2	62.0	58.2	54.6	50.9	46.8	81.4
47	19-32	11/18/93	3-2	V	V		51	45.9	46.5	62.1	60.4	54.6	57.8	55.5	60.5	64.5	67.7	75.2	69.7	71.9	73.8	70.8	70.8	71.3	67.8	67.7	68.4	65.8	65.2	62.3	61.0	82.1
48	19-33	11/18/93	3-2	D	V		40	44.4	42.8	66.6	55.7	58.1	64.2	61.1	63.0	74.5	71.7	71.4	75.7	72.2	72.5	71.1	69.5	69.0	67.9	67.5	70.2	69.9	62.0	64.0	56.1	83.2
49	19-34	11/18/93	3-2	H	V		52	42.8	49.9	64.8	55.0	55.0	59.3	60.2	63.1	60.7	70.7	74.1	67.8	72.1	71.7	69.0	68.9	68.2	64.4	62.2	59.6	57.4	54.9	50.6	47.1	80.5
50	19-36	11/18/93	3-3	D	V		43	44.8	59.5	62.9	57.2	61.8	60.9	60.2	65.7	66.8	74.8	69.0	68.4	71.2	72.5	69.7	72.2	69.8	72.8	70.6	67.1	62.3	56.9	55.3	52.2	82.2
51	19-37	11/18/93	3-2	F	V	U	50	42.3	45.9	66.3	55.5	63.7	70.1	64.7	67.0	66.8	76.0	73.4	71.3	73.2	75.0	72.7	70.5	67.7	65.3	65.0	66.5	63.8	59.3	54.6	51.8	83.2
52	19-38	11/18/93	3-2	V	V		48	39.2	52.1	63.0	60.1	58.6	65.3	64.3	64.1	63.9	70.9	73.3	71.9	77.0	76.9	74.2	72.1	70.6	68.5	66.8	65.6	60.6	56.9	54.5	53.9	83.7
53	19-40	11/18/93	3-2	V	V		60	47.9	54.8	61.0	57.4	60.3	60.7	59.7	60.9	71.3	64.3	76.0	72.3	73.7	75.3	72.0	70.1	69.2	68.6	66.9	65.6	61.2	58.9	54.5	50.4	82.8
54	19-41	11/18/93	3	G			46	43.5	45.3	65.0	50.5	53.7	62.0	58.6	67.1	62.2	60.3	64.8	65.6	68.0	71.0	69.4	67.9	66.3	65.3	64.8	63.3	59.6	57.9	54.8	51.4	78.4
55	19-47	11/18/93	3	T			52	39.1	53.2	44.7	58.5	55.6	67.5	63.0	65.8	69.8	66.6	72.8	69.4	69.7	71.3	68.3	67.3	68.8	66.6	64.2	61.4	59.1	59.5	56.7	52.3	80.4
56	19-48	11/18/93	3	F	V	U	47	38.7	42.1	58.5	54.9	55.7	56.1	58.6	60.7	63.6	69.4	70.9	72.5	71.7	70.5	70.9	70.8	69.8	67.5	64.8	63.7	59.0	56.2	53.0	49.2	80.7
57	19-49	11/18/93	3-2	F	V	L	48	41.5	47.3	57.7	55.0	57.5	56.7	61.0	62.7	63.3	73.1	70.8	72.0	73.3	72.4	69.6	68.0	69.9	66.9	64.5	61.5	59.5	61.5	55.1	50.2	81.2
58	19-50	11/18/93	4	D	V		41	42.0	54.1	69.7	55.1	56.3	59.0	65.6	71.9	62.3	63.2	73.5	73.3	69.8	79.0	68.4	68.3	69.0	65.8	65.1	62.3	61.6	59.2	58.5	55.5	83.0
59	19-51	11/18/93	4	D	V		41	37.1	48.1	63.9	51.6	57.9	59.2	63.4	70.2	79.9	63.3	63.8	69.8	68.7	69.2	68.6	69.0	68.4	66.1	63.5	65.9	60.4	58.0	54.6	51.4	82.5
60	19-53	11/18/93	2-2	V			37	39.9	65.4	49.2	53.3	57.4	56.3	57.2	57.0	59.7	60.6	62.5	64.9	67.6	69.6	65.4	62.8	62.5	61.3	58.6	54.6	52.2	49.9	47.0	43.6	75.7
61	19-54	11/18/93	3-2	V	V		49	40.3	47.8	48.4	62.7	57.9	56.9	62.6	62.3	65.8	73.0	70.5	72.4	77.3	74.2	73.0	72.6	72.4	69.5	67.8	65.4	61.2	58.4	54.7	49.5	83.3
62	19-55	11/18/93	3-2	V	V		53	45.6	45.2	56.8	57.2	60.0	61.7	65.1	69.9	64.5	66.8	70.8	70.8	74.6	74.6	70.1	70.1	72.5	66.2	65.2	64.9	61.3	56.3	52.0	48.5	82.0
63	19-59	11/18/93	3-2	H	V		49	43.2	47.1	52.3	53.0	56.8	59.5	62.7	64.4	64.0	69.6	66.0	70.6	70.3	70.2	68.7	66.2	65.7	65.8	63.6	63.0	59.6	56.8	54.7	49.4	79.0
64	19-63	11/18/93	2-1	V			46	46.4	51.4	48.9	55.5	62.0	56.2	61.2	63.5	62.4	67.3	64.3	66.7	66.9	67.0	67.2	66.8	65.7	64.0	62.4	60.2	56.4	53.7	51.3	46.7	77.0
65	19-64	11/18/93	3-2	V	V		61	47.4	57.0	60.9	56.6	62.5	57.5	59.5	58.3	64.9	65.4	69.5	70.1	73.3	73.4	70.0	70.5	69.1	69.2	68.6	65.6	62.5	60.8	57.5	52.0	81.0
66	19-65	11/18/93	3-2	D	V		47	46.1	51.4	65.9	58.1	59.6	62.9	61.1	68.3	66.6	70.9	67.1	67.6	72.4	71.4	69.1	70.1	69.5	66.3	64.6	65.2	61.5	57.3	55.5	50.7	80.6
67	19-66	11/18/93	3-2	F	V	L	40	39.3	41.1	64.2	67.0	62.4	62.9	69.4	70.2	66.2	70.6	71.7	71.0	71.5	70.1	70.8	72.4	72.8	72.2	69.4	66.2	63.3	60.3	55.9	53.2	82.5
68	19-69	11/18/93	3	D	V		46	38.9	45.3	77.4	55.4	60.6	62.8	61.3	70.9	77.0	73.8	69.0	68.7	69.0	71.4	70.1	72.1	73.2	71.6	69.5	64.5	61.5	60.3	58.4	55.0	84.2
69	19-70	11/18/93	3-2	V	V		43	46.6	46.2	58.4	51.2	61.7	62.1	63.9	66.0	71.1	72.5	72.7	72.2	71.3	70.3	69.6	67.4	67.9	65.2	63.9	62.1	61.7	61.3	57.0	52.6	81.2
70	19-71	11/18/93	4	D	V		45	41.7	44.1	55.5	66.0	56.5	58.5	63.2	66.2	81.6	78.6	68.0	70.3	72.3	73.6	70.9	72.5	71.3	68.7	66.0	66.0	62.1	60.1	59.9	53.4	85.4
71	19-72	11/18/93	2-3	D	V		38	39.4	67.9	50.0	55.8	65.7	58.7	62.9	62.3	65.0	70.0	73.8	77.3	74.8	71.8	75.0	74.1	75.3	76.9	72.4	73.2	71.0	66.7	60.8	53.5	85.4
72	19-73	11/18/93	3-2	F	V	L	45	39.3	41.8	62.8	64.7	54.4	59.8	59.3	59.0	61.7	67.6	68.8	68.7	72.0	72.7	68.9	69.5	71.0	68.9	66.0	63.8	61.7	60.3	55.0	53.2	80.4
73	19-75	11/18/93	3-2	OT	V		68	46.4	51.8	56.1	67.6	54.6	61.6	64.3	66.9	64.6	65.5	75.2	71.9	73.8	77.0	73.7	74.1	73.1	70.3	68.0	69.7	66.7	60.8	56.5	55.8	83.9
74	19-76	11/18/93	3-2	T	V		50	36.8	43.5	53.0	53.4	52.1	59.9	60.2	58.9	62.7	65.7	69.4	69.6	72.7	74.1	70.6	70.6	70.9	67.2	64.3	63.2	62.2	57.9	54.8	51.0	80.7
75	19-80	11/18/93	3-2	OT	V		52	45.4	45.0	63.6	53.5	56.9	59.2	58.9	62.2	63.8	67.0	73.1	70.4	74.1	75.4	72.5	69.9	68.8	66.4	65.6	61.8	61.9	60.6	58.9	54.7	81.9
76	20-1	09/24/92	3-2	V	V		54*	42.1	47.6	62.1	50.9	57.2	58.7	54.6	58.5	61.9	81.7	72.2	66.3	71.4	69.6	72.6	72.3	69.3	68.8	64.6	64.7	65.0	57.3	52.4	47.5	84.1
77	20-4	09/24/92	3	CM	V		48*	31.2	41.4	62.3	47.2	57.1	57.1	55.5	59.5	69.9	66.9	75.1	71.8	68.1	72.9	70.4	70.1	69.4	66.3	62.6	62.5	58.0	55.4	52.9	47.0	81.2
78	20-5	09/24/92	3	TT	V	L	35*	37.5	42.2	65.7	53.7	58.9	57.3	59.8	74.7	77.8	78.7	66.7	69.8	73.8	71.7	70.5	70.4	67.3	63.9	63.0	62.1	58.2	54.9	50.7	45.5	84.1
79	20-7	09/24/92	3-2	V	V		45*	34.8	51.7	57.3	55.8	59.4	55.1	59.4	61.1	62.5	66.7	75.5	72.3	70.4	71.0	67.8	69.3	67.4	64.7	60.2	58.3	55.4	53.7	51.5	46.7	80.5
80	20-14	09/24/92	3-2	V	V		48*	47.8	51.0	62.8	57.4	57.4	60.6	57.8	58.5	58.1	66.6	69.6	67.4	67.8	71.8	66.9	67.5	69.2	66.6	64.5	60.9	54.9	53.1	50.8	47.5	78.7

Figure C-10. Heavy Trucks- Level, Non-Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
81	20-19	09/24/92	3	TR	V		55*	33.9	39.2	54.8	52.6	50.6	56.1	57.4	61.1	66.8	66.1	66.9	67.2	69.5	67.1	68.3	68.6	67.1	63.0	61.8	56.9	54.4	51.5	50.0	44.0	77.8
82	20-20	09/24/92	3-2	V	V		48*	48.7	56.7	54.3	54.8	58.9	59.0	57.8	63.7	69.3	64.2	65.4	67.4	70.6	67.9	67.4	65.9	67.0	64.7	62.3	59.0	55.0	59.2	51.2	46.2	78.1
83	20-24	09/24/92	3-2	V	V		48*	41.9	45.7	69.2	53.2	56.8	69.1	62.2	62.0	67.7	68.3	68.9	69.0	69.7	72.9	69.1	68.2	68.7	62.8	63.5	63.5	60.5	57.0	52.5	47.4	80.3
84	20-25	09/24/92	3-2	V	V		45*	46.7	44.2	48.6	61.6	56.5	57.9	62.3	64.6	68.9	74.6	72.7	67.3	69.4	68.9	68.7	67.9	65.9	65.1	61.8	61.3	56.0	57.8	53.1	49.1	80.4
85	20-26	09/24/92	3-2	V	V		43*	40.5	62.8	54.5	52.6	56.1	54.6	63.4	59.3	62.0	66.3	64.3	68.7	76.0	68.8	69.6	68.8	67.4	63.8	61.2	60.5	57.0	53.6	50.7	45.8	79.9
86	20-28	09/24/92	2-2	V	V		41*	42.0	45.0	43.1	51.3	50.9	52.7	59.1	62.9	63.3	62.6	65.6	66.6	71.3	67.9	65.4	65.6	63.4	61.7	57.9	55.4	52.4	49.6	48.3	44.1	76.7
87	20-32	09/24/92	2-2	V	V		44*	51.6	46.9	60.0	66.3	56.4	59.8	59.6	60.3	65.8	66.3	69.7	71.6	74.8	72.6	72.2	71.2	70.9	65.8	64.1	66.8	62.8	57.9	55.8	53.2	81.6
88	20-33	09/24/92	3-2	V	V		49*	40.3	46.3	57.1	54.7	56.4	55.5	59.9	63.1	62.5	63.5	67.3	68.5	72.8	72.8	72.4	69.9	70.8	65.9	65.8	62.8	61.0	57.0	54.5	51.7	80.4
89	20-34	09/24/92	3	TR	V		50*	36.6	39.2	57.7	55.5	53.0	57.8	55.9	56.2	66.6	64.7	74.2	67.2	67.8	69.5	68.5	68.6	66.2	65.8	60.7	58.9	57.9	57.9	57.6	53.7	79.2
90	20-37	09/24/92	3-2	V	V		45*	54.1	45.0	53.5	55.5	55.7	56.4	60.2	65.6	65.9	71.3	65.7	69.3	71.4	68.7	69.1	68.8	67.5	65.0	63.8	62.7	58.5	54.0	51.9	46.2	79.4
91	20-39	09/30/92	3	F	H	L	52*	45.0	43.8	44.2	48.8	53.6	57.2	71.2	76.4	71.8	64.5	66.8	66.1	67.0	65.8	64.3	64.9	61.2	60.2	57.2	53.8	51.9	48.5	46.0	40.9	80.1
92	20-48	09/30/92	3-2	V	V		44*	45.5	51.1	45.9	51.0	54.2	54.3	57.5	61.8	72.5	69.0	63.9	66.4	67.9	66.5	65.7	64.5	62.2	59.4	58.0	54.3	51.5	48.3	46.8	41.1	77.5
93	20-49	09/30/92	3-2	?	V	L	45*	35.7	39.6	49.4	64.7	57.7	60.8	65.0	57.5	63.5	65.6	73.6	70.5	68.5	73.9	70.4	69.4	67.8	64.8	62.9	60.1	57.2	55.2	51.9	47.3	80.5
94	20-50	09/30/92	2-2	V	V		45*	47.2	47.7	69.8	54.9	58.6	61.0	56.4	61.0	63.0	71.0	66.3	67.4	70.7	71.0	70.2	68.9	66.8	65.4	63.4	60.0	57.9	54.5	51.6	49.1	79.7
95	20-51	09/30/92	3	TR	V		55*	34.6	53.1	47.2	55.3	56.2	53.4	59.4	65.1	69.0	63.6	69.5	66.2	68.1	69.1	68.6	67.4	66.4	62.2	61.0	57.6	54.3	51.0	48.3	43.7	78.1
96	20-52	09/30/92	3-2	V	V		46*	48.3	47.1	50.7	63.6	56.2	64.2	64.0	63.6	65.7	68.8	69.3	71.3	71.7	72.3	72.1	71.1	68.7	67.8	64.9	63.8	61.1	56.3	53.3	50.0	81.0
97	20-54	09/30/92	3	D	V		53*	38.0	40.8	73.2	57.7	57.0	58.1	61.6	64.8	71.0	71.8	73.0	69.1	69.6	75.8	76.6	74.2	74.1	76.2	71.6	70.4	70.5	67.4	61.8	53.9	85.0
98	20-59	09/30/92	3-2	V	V		46*	42.3	57.1	67.4	52.5	55.5	56.3	62.5	63.6	65.4	65.3	69.3	68.2	68.2	68.5	67.5	66.8	64.7	62.6	60.1	57.9	53.6	50.8	50.0	43.8	78.0
99	20-61	09/30/92	3-2	V	V		46*	42.0	45.4	54.1	51.2	57.8	64.3	58.0	61.1	59.3	67.7	65.9	68.0	71.1	70.0	69.4	69.8	68.6	64.6	62.3	60.1	57.5	54.0	48.9	44.0	78.9
100	20-63	09/30/92	2-2	V	V		38*	46.4	48.2	50.2	58.5	56.8	58.0	63.2	61.8	65.6	69.2	70.4	70.9	69.5	69.8	71.0	68.9	67.4	65.9	64.9	62.0	59.7	55.3	51.7	47.8	79.8
101	20-64	09/30/92	3-2	V	V		46*	47.1	50.7	61.8	51.0	57.1	59.7	64.6	71.7	69.6	69.9	68.6	68.2	68.7	68.0	67.9	67.0	64.9	62.3	60.3	57.4	55.3	52.1	49.7	47.4	79.3
102	20-69	09/30/92	2-2	V	V		36*	40.5	47.9	53.9	56.0	56.8	58.8	58.1	60.3	59.9	66.6	69.5	69.8	69.2	68.6	71.3	68.1	66.9	64.5	63.4	62.2	59.3	56.0	51.6	48.6	78.8
103	21-5	12/08/93	3	T	V		49	38.0	61.5	53.4	48.9	57.8	57.8	57.8	59.3	62.9	74.7	73.8	66.1	77.4	75.4	73.7	72.6	70.8	69.4	66.6	63.8	61.2	57.2	54.5	49.8	83.5
104	21-6	12/08/93	3	D	V		49	36.8	50.0	64.0	50.3	56.6	59.1	57.4	61.4	74.1	65.6	68.6	66.0	69.5	74.3	77.9	72.3	70.4	69.3	67.7	63.7	60.3	59.0	56.2	51.1	82.8
105	21-8	12/08/93	3-2	F	V	L	48	41.6	42.7	61.3	53.0	60.8	62.8	61.5	62.2	65.1	65.9	69.6	66.2	69.4	73.8	71.4	71.8	69.6	67.5	64.9	62.7	59.9	56.7	54.4	50.8	80.5
106	21-10	12/08/93	3-2	F	V	L	50	40.4	46.0	59.4	52.9	60.4	59.0	61.4	61.3	62.7	76.6	75.8	67.9	72.3	72.8	71.8	71.0	70.0	67.0	65.7	63.8	62.0	58.9	57.6	52.5	82.7
107	21-14	12/08/93	3	G			52	48.2	48.8	49.9	64.9	57.9	62.6	60.2	61.2	70.5	76.5	70.2	66.3	70.5	73.0	75.8	73.4	74.3	73.5	71.6	69.0	65.9	63.4	59.3	56.5	83.9
108	21-15	12/08/93	3	CM	V		42	49.9	49.7	55.1	65.9	62.8	66.8	68.6	72.9	66.2	64.0	75.2	74.6	72.0	74.8	74.6	78.3	72.4	70.3	68.4	68.5	62.0	57.8	54.8	50.5	84.7
109	21-20	12/08/93	3-2	D	V		57	42.9	45.1	60.6	51.9	56.7	57.9	61.7	62.8	63.9	63.7	76.9	74.3	72.2	74.0	75.6	74.0	73.4	71.6	69.3	67.6	64.4	62.0	59.6	54.3	83.9
110	21-21	12/08/93	3-2	F	V	L	49	40.1	50.9	48.3	65.2	59.9	63.4	66.6	66.8	68.2	70.7	72.8	72.8	73.0	74.4	73.9	73.5	71.4	68.6	70.4	68.5	65.3	65.6	61.0	59.5	83.3
111	21-22	12/08/93	3-2	V	V		52	42.6	53.4	62.7	61.7	61.6	63.3	58.4	61.9	64.6	64.9	71.6	72.6	70.3	73.7	73.9	77.8	70.7	70.2	66.8	64.7	61.4	60.0	56.7	53.1	83.0
112	21-24	12/08/93	3-2	F	V	L	47	38.1	45.6	48.6	67.1	59.7	65.1	65.0	68.6	77.9	76.6	70.1	69.6	71.3	75.3	74.3	72.8	72.6	69.3	69.8	65.6	63.4	62.1	59.2	56.1	84.5
113	21-25	12/08/93	3-2	V	V		41	51.3	47.4	48.7	68.2	59.0	60.1	64.3	62.5	69.9	67.9	65.9	71.1	70.6	71.2	72.0	72.5	69.4	69.2	66.4	67.4	64.1	63.4	58.6	52.8	81.4
114	21-27	12/08/93	3-2	D	V		44	41.3	41.6	51.1	59.0	55.9	55.7	57.8	56.9	65.1	72.1	67.3	66.3	74.2	73.7	74.2	73.4	70.5	68.7	66.3	64.2	60.8	57.1	55.1	49.9	82.0
115	21-28	12/08/93	3-2	D	V		44	44.2	55.2	48.4	54.3	57.6	57.8	57.1	61.1	64.1	74.4	68.4	65.9	71.5	73.2	73.9	72.0	71.2	73.7	72.4	73.9	69.0	60.4	55.7	51.4	83.2
116	21-29	12/08/93	3	D			49	43.6	42.2	64.1	49.0	50.4	56.2	58.7	54.9	62.4	68.0	66.1	74.2	68.7	71.5	76.0	72.1	71.2	69.0	66.1	64.6	60.8	57.5	54.9	51.4	81.8
117	21-30	12/08/93	3-2	V			49	47.7	48.0	57.4	57.6	58.7	66.7	61.3	65.5	78.0	69.0	69.1	71.0	74.4	74.5	74.0	73.4	71.3	69.4	67.4	63.9	63.1	59.5	56.2	52.0	83.8
118	21-31	12/08/93	2-2	V	V		46	44.1	51.1	61.3	50.9	58.6	61.8	56.4	59.7	62.4	72.6	67.2	63.4	68.7	71.9	71.9	69.9	67.7	65.9	63.8	60.9	57.4	54.3	51.3	47.4	79.8
119	21-32	12/08/93	3-2	D	V		51	41.8	50.6	60.0	52.2	58.9	57.5	61.0	60.1	66.8	73.8	77.9	72.0	74.4	76.9	75.1	75.6	74.1	71.5	70.5	67.7	65.9	63.6	59.9	57.5	85.1

Figure C-10. Heavy Trucks- Level, Non-Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
120	21-36	12/08/93	3-2	F	V	L	52	41.1	47.2	50.6	58.9	59.3	62.0	67.8	65.8	66.4	69.5	68.5	72.6	74.2	75.1	74.9	72.8	71.2	72.3	69.0	69.5	66.2	61.9	60.0	57.9	83.3
121	21-38	12/08/93	3-3	F		L	42	39.1	46.4	52.6	55.9	57.5	66.8	62.4	66.8	68.7	73.8	71.1	68.2	76.1	74.1	74.6	72.3	73.3	69.3	67.7	67.9	64.6	63.0	56.7	52.0	83.5
122	21-39	12/08/93	3-2	D	V		51	44.4	48.3	60.3	51.6	55.2	57.9	56.1	62.6	65.0	67.4	75.2	69.4	68.2	77.5	73.8	73.9	72.2	70.2	67.0	65.1	61.9	59.3	55.2	52.9	83.1
123	21-41	12/08/93	3-2	D	V		52	40.0	47.1	55.1	56.5	55.9	59.5	60.2	61.1	65.4	75.4	74.9	68.6	71.0	75.6	74.8	74.7	73.5	71.7	69.9	67.6	65.9	65.6	60.7	52.1	84.0
124	21-44	12/08/93	3-2	V	V		54	56.7	51.2	56.9	61.3	54.7	58.3	64.7	71.6	67.7	63.6	81.0	66.5	72.1	75.7	73.7	73.2	70.4	68.4	64.9	61.6	58.6	57.3	53.5	51.7	84.5
125	21-45	12/08/93	3-2	V	V		48	46.0	53.6	64.1	48.3	53.6	55.9	57.8	59.2	63.5	77.0	67.1	67.4	71.2	71.6	71.7	69.4	68.3	66.9	65.4	62.3	61.0	59.9	57.1	54.0	81.4

Figure C-11. Heavy Trucks - Upgrade, Non-Controlled Access Roadways

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	22-4	10/01/92	3	D	V		52*	42.6	47.2	61.7	51.9	55.6	56.8	56.8	58.9	61.0	63.6	64.6	77.4	70.4	73.3	72.0	68.2	69.2	70.2	64.1	62.5	60.6	56.4	55.5	56.1	81.7
2	22-5	10/01/92	4	F	V	L	49*	41.0	50.3	48.9	70.6	54.1	56.1	58.0	64.2	75.3	75.9	71.3	72.6	76.0	78.2	73.0	71.3	70.7	68.7	66.4	65.9	62.0	60.3	56.1	50.8	84.6
3	22-6	10/01/92	3-2	V	V		43*	50.1	52.2	56.3	59.6	54.6	57.8	64.2	68.1	63.2	66.3	66.2	69.4	71.4	74.6	70.0	68.8	68.9	65.3	64.9	60.2	55.7	52.9	53.4	50.8	80.3
4	22-9	10/01/92	2-2	F	V	U	53*	33.3	40.5	45.2	50.3	76.0	60.4	55.9	73.1	65.4	58.0	62.3	67.0	70.6	74.3	72.2	69.0	69.4	68.3	66.5	67.8	68.7	68.2	62.0	55.5	82.5
5	22-10	10/01/92	3-2	F	V	L	43*	42.6	42.4	65.4	51.6	57.6	64.0	67.0	64.4	65.2	63.1	64.7	69.4	70.8	70.8	71.0	68.9	65.8	65.4	64.0	61.5	56.8	55.9	53.9	49.9	79.5
6	22-15	10/01/92	3	CM	V		48*	36.5	44.3	48.4	52.5	62.5	56.2	57.9	62.4	60.7	64.4	61.8	64.6	67.8	72.2	76.6	70.3	68.3	66.0	63.7	60.2	56.3	53.5	52.7	47.6	80.3
7	22-16	10/01/92	3	G	V		52*	42.3	46.2	68.2	52.2	57.5	57.4	57.4	62.4	80.2	61.0	62.0	65.4	70.7	71.0	69.1	67.6	66.4	63.0	60.7	62.7	56.6	54.8	54.4	49.0	82.3
8	22-21	10/01/92	3	CM	V		47*	39.7	43.9	43.2	65.1	54.0	53.8	60.7	63.8	70.2	67.7	64.0	66.5	68.8	76.2	71.2	68.0	72.0	66.7	64.2	60.2	57.3	54.4	52.0	47.9	80.9
9	22-29	10/01/92	3-2	V	V		42*	40.4	47.2	50.8	54.7	54.4	55.5	60.3	61.9	57.3	67.1	62.6	64.8	72.0	72.8	69.4	66.3	65.8	62.5	58.6	55.2	50.3	48.5	49.8	41.3	78.4
10	22-30	10/01/92	3-2	V	V		49*	47.5	47.2	73.9	56.1	58.9	65.5	60.7	64.9	68.6	69.8	74.8	69.9	74.8	77.1	76.6	76.0	78.6	75.1	69.9	69.3	64.8	62.3	57.8	50.9	85.9
11	22-36	10/01/92	3-2	V	V		44*	36.4	42.0	51.6	51.4	56.0	55.5	58.4	59.1	58.6	60.2	65.1	67.2	71.5	71.7	69.6	65.9	71.5	62.8	59.9	59.5	55.6	52.5	52.2	45.3	78.6
12	22-40	10/01/92	3-2	F	V	L	51*	42.3	44.7	58.4	49.7	53.3	62.4	64.8	72.1	67.8	69.1	68.4	70.6	70.5	72.8	72.2	69.3	68.3	66.9	63.6	60.4	58.8	56.1	53.3	48.7	81.0
13	22-41	10/01/92	3	F	V	L	48*	44.2	46.5	51.7	61.6	62.3	65.1	69.0	65.7	62.4	63.9	69.7	67.3	70.9	73.8	74.9	71.8	71.0	74.2	68.2	63.7	59.5	57.7	55.7	51.4	82.3
14	22-44	10/01/92	3-2	V	V		47*	39.9	44.0	58.1	49.4	55.3	54.6	59.0	75.0	64.3	62.4	70.9	67.4	71.2	74.2	68.7	67.8	66.1	63.3	59.9	57.0	53.2	51.4	53.4	51.0	80.7
15	22-45	10/01/92	3	D	V	L	46*	29.9	61.3	49.1	50.1	75.6	63.5	56.4	57.2	68.5	62.9	66.6	64.5	67.5	69.1	66.7	67.3	67.8	65.1	60.6	57.8	55.9	52.3	54.1	49.6	79.7
16	22-46	10/01/92	3	D	V	L	36*	37.7	54.4	59.5	48.2	56.0	58.7	57.0	56.8	64.0	55.0	65.1	65.6	67.1	70.5	64.8	65.2	64.8	62.0	58.9	56.9	54.0	50.9	50.8	47.2	76.3
17	22-47	10/01/92	3	D	V	L	47*	39.9	43.4	67.0	53.6	60.4	58.3	55.1	57.6	67.9	68.0	67.0	69.8	73.8	72.9	68.6	71.0	69.3	67.4	64.4	61.8	60.7	59.4	57.0	52.1	80.8
18	22-49	10/01/92	3	F	V	L	51*	35.3	46.8	44.7	51.6	55.9	53.3	57.3	74.5	69.3	58.3	62.3	69.2	77.7	79.3	71.0	69.5	68.7	66.7	65.2	60.6	55.3	52.3	49.5	45.7	83.6
19	22-50	10/01/92	3	D	V		50*	37.1	55.6	44.6	47.4	66.1	58.0	59.5	64.0	72.9	63.2	67.7	69.2	71.1	72.2	70.9	69.5	67.7	67.2	61.4	64.1	58.6	56.4	54.2	47.8	80.5
20	22-56	10/01/92	3-2	V	V		45*	38.7	65.1	64.5	52.0	63.3	61.9	67.6	62.9	62.3	68.8	67.0	67.5	71.2	72.8	68.9	68.1	66.8	67.0	64.4	62.2	61.6	58.5	55.5	49.2	80.0
21	24-1	12/14/93	3-2	V	V		45	50.0	59.0	51.8	54.1	53.8	56.1	64.8	64.5	64.6	70.3	67.8	66.7	70.2	72.7	70.9	68.1	67.6	65.9	66.8	66.9	63.0	60.2	56.3	52.5	80.1
22	24-2	12/14/93	3-2	V	V		41	49.0	45.8	52.0	62.2	56.5	64.2	79.8	63.0	73.9	75.1	77.1	74.2	71.2	76.9	74.1	76.7	69.6	66.8	67.4	66.2	63.6	63.0	59.8	53.8	86.0
23	24-3	12/14/93	2-1	V			45	41.5	50.0	56.4	54.6	61.5	64.3	64.0	66.6	65.2	64.5	70.7	66.4	68.7	68.6	70.0	69.8	67.2	66.6	65.6	60.2	57.2	54.7	51.9	47.4	79.3
24	24-4	12/14/93	3-2	D	V		34	44.9	42.7	52.9	72.1	59.9	60.2	74.4	67.9	76.7	75.7	80.6	80.0	78.2	79.6	82.9	81.2	84.2	85.4	81.8	76.8	74.2	69.5	63.9	55.9	92.3
25	24-6	12/14/93	3-2	V	V		44	50.7	47.4	58.6	50.0	51.3	56.8	59.6	61.0	63.0	79.1	70.0	68.0	72.3	73.7	71.3	71.4	70.0	66.9	65.7	64.0	62.6	59.2	54.0	49.8	82.9
26	24-7	12/14/93	3-2	V	V		40	45.3	47.2	51.1	46.1	57.4	61.8	65.9	64.6	65.9	68.9	67.8	71.1	76.5	72.2	72.8	73.5	70.1	67.0	67.6	65.3	59.5	57.0	52.8	48.2	82.3
27	24-8	12/14/93	3-2	V	V		46	46.5	46.9	57.7	46.4	54.3	57.0	62.0	61.9	68.7	69.7	68.6	68.7	71.9	71.4	69.7	69.8	68.8	68.9	65.9	64.7	63.8	59.6	55.9	56.7	80.5
28	24-9	12/14/93	3-2	V	V		43	49.9	52.4	47.7	53.1	59.5	58.4	66.0	66.0	64.0	72.4	73.5	68.4	69.1	73.4	73.9	72.9	69.4	66.8	65.1	63.2	58.8	56.3	53.1	48.8	81.9
29	24-10	12/14/93	3-2	T	V		33	42.6	44.8	54.2	52.6	56.0	59.3	57.2	62.9	78.2	67.5	68.1	69.7	69.8	71.3	70.7	69.8	68.5	67.0	65.3	65.2	62.0	59.7	58.3	57.9	82.0
30	24-12	12/14/93	3	D			45	39.0	47.6	62.6	50.5	53.4	63.2	59.6	66.4	76.5	69.4	70.0	70.3	72.8	72.4	72.3	69.4	68.1	66.4	63.8	60.3	58.9	55.1	55.5	50.4	82.1
31	24-15	12/14/93	3	D			45	46.4	66.7	46.8	50.8	73.0	60.2	64.7	69.7	68.4	70.6	72.1	72.8	72.6	71.0	71.7	70.6	69.4	67.3	65.7	62.5	60.3	57.4	55.9	51.2	82.3
32	24-16	12/14/93	3-2	V	V		45	44.3	47.6	60.5	52.0	62.7	76.3	70.4	73.0	71.9	74.1	74.8	76.6	77.5	80.5	80.5	82.1	84.3	83.3	78.4	72.3	65.2	60.8	55.0	50.7	90.8
33	24-18	12/14/93	3	D	V		49	44.8	45.4	58.7	48.0	53.4	57.2	60.8	62.5	65.6	77.8	68.0	65.8	67.7	68.4	75.4	71.7	70.4	69.7	67.6	65.5	60.3	56.5	55.1	49.8	82.4
34	24-19	12/14/93	3-2	V	V		45	43.1	45.2	60.1	45.5	58.7	63.0	66.1	70.1	72.7	73.0	71.0	70.3	72.0	72.8	75.6	74.7	72.0	68.9	65.8	64.3	62.4	62.8	61.1	56.4	83.3
35	24-20	12/14/93	3-2	F	V	L	44	40.6	44.0	43.6	51.4	56.9	61.8	75.9	68.1	70.2	74.6	77.1	67.4	70.2	73.2	73.2	73.3	71.0	70.9	68.5	65.6	61.5	59.4	56.3	53.7	84.1
36	24-21	12/14/93	3-2	T	V		39	43.2	63.7	48.0	43.9	57.4	57.3	68.0	71.7	69.2	76.6	72.5	70.3	72.8	73.1	73.3	72.0	69.8	67.7	65.6	62.5	61.0	58.8	56.7	52.6	83.2
37	24-24	12/14/93	3	D	V		46	42.6	44.2	73.8	52.4	54.9	73.9	63.2	67.2	64.9	75.2	73.5	76.7	73.4	74.9	73.1	74.8	70.3	69.9	66.6	63.6	60.9	61.4	55.4	53.2	84.7
38	24-26	12/14/93	3-2	D	V		45	41.7	50.1	57.2	57.3	60.5	67.5	68.6	69.4	68.0	67.0	69.7	70.5	71.7	74.6	72.9	71.8	69.3	68.0	65.9	62.9	60.3	58.0	54.9	52.0	82.0
39	24-27	12/14/93	3-2	T	V		45	42.7	46.9	47.9	62.0	51.0	61.3	66.0	65.3	73.8	74.1	73.5	70.9	71.9	73.7	73.8	73.4	70.7	68.2	67.3	65.3	62.3	61.5	62.3	56.9	83.3
40	24-28	12/14/93	3	D			49	43.1	45.4	47.5	63.8	57.7	66.9	67.5	70.0	71.7	71.6	70.8	72.9	75.3	73.9	74.7	72.2	68.6	69.8	69.8	65.9	62.9	59.3	57.0	57.0	83.5
41	24-29	12/14/93	3-2	V	V		34	47.4	41.5	51.2	44.5	53.1	62.8	62.3	66.0	73.6	70.5	68.6	70.4	67.8	70.0	71.3	68.9	67.4	66.7	64.9	61.7	57.2	54.8	54.1	50.6	80.5

Figure C-11. Heavy Trucks - Upgrade, Non-Controlled Access Roadways
(Continued)

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	24-30	12/14/93	2-2	V	V		45	41.3	46.9	59.1	50.7	55.3	57.2	63.3	62.6	77.0	67.1	67.1	68.9	69.0	70.2	67.8	68.1	68.4	67.0	64.6	65.7	58.9	57.9	53.9	51.3	81.0
43	24-33	12/14/93	3-2	V			46	53.5	47.6	57.4	46.7	51.5	61.1	59.6	64.3	62.8	79.6	71.6	68.4	71.4	71.2	70.2	70.6	69.3	67.1	64.8	61.1	58.4	58.0	57.3	55.7	82.8
44	24-34	12/14/93	3	D	V		43	46.5	48.8	48.6	61.6	55.1	59.1	69.0	68.5	72.4	67.9	71.6	72.4	68.7	70.8	70.8	69.0	68.3	67.3	65.9	61.3	59.6	57.9	56.6	53.4	81.2
45	24-35	12/14/93	3-2	D	V		44	41.7	40.8	59.9	53.0	54.4	58.9	62.7	63.2	70.6	78.9	71.8	73.2	70.6	74.0	72.1	72.6	71.3	70.1	70.5	68.8	66.1	60.2	55.4	59.5	84.0
46	24-37	12/14/93	3-2	F	V	L	48	40.3	58.0	46.0	52.8	55.7	59.5	66.7	70.6	74.1	70.8	68.4	70.1	72.2	72.1	71.1	69.4	67.8	66.1	64.6	61.9	60.1	67.5	60.1	50.9	81.8
47	24-38	12/14/93	3-2	F	V		36	43.9	60.9	46.6	54.4	59.5	54.7	59.4	62.5	70.7	66.5	70.8	69.0	68.9	72.3	71.3	69.6	68.8	65.7	63.7	59.4	57.2	58.1	54.8	51.0	80.2
48	24-39	12/14/93	3-2	T	V		42	43.6	44.6	61.5	52.7	56.0	59.6	62.0	61.8	69.6	77.3	68.2	70.0	71.0	74.2	73.0	70.9	70.0	67.8	65.7	65.1	65.2	61.0	58.8	53.2	82.7
49	24-40	12/14/93	3-2	T	V		45	39.1	46.3	52.2	51.6	49.1	61.1	67.2	69.0	68.2	71.0	69.2	70.4	73.1	74.3	72.7	71.8	72.0	67.8	64.0	62.1	59.0	56.4	54.0	50.8	82.1
50	24-41	12/14/93	3-2	T	V		38	49.1	41.2	58.8	47.4	60.5	65.4	64.4	67.5	64.6	63.8	66.3	66.7	69.2	69.8	71.2	69.1	67.1	68.2	65.5	63.8	58.7	56.0	52.7	48.1	79.4
51	24-43	12/14/93	3-2	T	V		37	41.3	41.4	62.4	49.4	56.4	64.9	60.0	65.3	68.8	70.2	67.3	68.3	69.9	70.5	69.2	70.4	67.0	64.6	64.8	62.4	62.3	61.9	61.5	58.2	80.0
52	24-44	12/14/93	3	D	V		53	42.0	60.7	48.6	49.8	51.0	51.3	56.8	63.9	74.7	59.4	63.1	67.0	69.6	73.7	72.3	72.4	71.3	70.2	70.1	66.8	57.9	53.6	49.4	46.8	81.7
53	24-45	12/14/93	3	CM	V		48	36.8	44.7	57.6	43.7	54.4	60.7	63.1	72.1	68.2	67.5	73.3	68.1	71.4	73.8	72.0	71.7	70.3	67.7	64.8	63.3	60.2	58.2	55.7	54.9	81.8
54	24-46	12/14/93	3-2	D	V		48	46.8	49.4	58.5	58.8	57.5	63.1	68.3	67.0	64.1	70.4	67.7	71.2	73.5	72.2	72.7	71.9	70.6	70.9	68.2	65.4	63.9	62.5	58.2	53.5	82.1
55	24-47	12/14/93	3-2	V	V		41	49.4	49.5	49.9	51.1	56.9	66.9	63.8	65.8	74.4	71.7	69.2	68.6	72.3	71.5	71.0	71.3	70.0	67.1	64.8	63.4	61.6	60.1	57.8	52.1	81.8
56	24-48	12/14/93	3	D	V		43	38.5	39.5	51.8	53.1	51.4	65.7	63.4	63.6	67.5	71.6	71.3	67.4	70.2	70.5	70.9	70.6	67.9	67.0	64.9	61.2	59.5	58.3	54.9	57.9	80.5
57	25-3	12/13/93	3-2	V	V		51	42.0	56.7	53.2	69.3	57.5	60.7	64.3	62.9	78.0	85.3	82.1	74.8	75.7	79.1	76.3	78.9	79.2	78.8	76.3	73.0	69.0	65.4	63.0	55.8	90.3
58	25-6	12/13/93	3-2	V	V		41	41.3	43.7	67.9	49.1	58.2	67.1	59.9	62.6	65.1	65.6	68.0	69.2	71.9	70.9	67.8	67.7	68.6	67.3	64.0	62.5	57.3	53.7	52.1	49.6	79.7
59	25-11	12/13/93	3-2	T	V		60	45.6	45.3	61.8	54.3	63.1	60.8	67.3	66.0	68.6	66.2	80.9	77.3	77.9	77.3	74.5	70.6	70.4	69.1	65.9	65.2	60.4	57.5	56.2	62.5	85.9
60	25-12	12/13/93	3	F	H	L	48	40.6	43.5	62.6	55.4	57.0	71.0	61.5	67.7	62.3	68.8	67.6	68.0	72.6	71.1	71.7	70.5	68.3	65.5	65.8	63.4	59.2	56.7	54.8	52.8	80.8
61	25-13	12/13/93	3-2	F	V	L	38	38.5	60.5	51.6	55.1	62.4	60.4	61.4	63.0	67.7	66.3	68.9	70.5	72.4	70.7	70.9	69.4	66.9	66.3	64.8	64.8	60.9	59.5	59.3	56.9	80.3
62	25-16	12/13/93	2-2	V	V		52	43.2	46.1	46.9	51.4	55.9	60.4	67.8	64.2	70.1	74.4	74.8	73.9	77.1	76.0	74.0	73.3	70.6	68.5	67.6	65.2	61.5	61.2	59.1	54.3	84.4
63	25-18	12/13/93	3	D	V	L	53	40.2	44.8	67.9	53.8	60.7	68.1	61.6	65.8	68.1	71.8	73.2	72.5	72.2	73.0	72.3	72.0	70.7	69.6	68.7	64.6	61.4	59.6	59.6	57.6	82.7
64	25-21	12/13/93	3	F		L	37	40.5	54.5	60.3	51.8	57.3	53.9	59.1	60.3	63.5	60.9	66.3	69.1	66.0	68.1	68.9	69.4	67.6	66.3	62.0	62.2	61.5	55.0	53.8	50.3	78.0
65	25-25	12/13/93	3-2	V	V		47	55.0	66.5	49.7	52.7	57.4	59.3	60.6	62.0	62.7	68.8	67.1	70.6	73.6	72.5	70.6	69.0	68.5	67.4	64.8	65.4	61.8	61.2	58.8	56.0	80.8
66	25-28	12/13/93	3-2	V	V		53	49.1	51.4	63.4	58.3	59.9	68.1	63.9	63.5	66.5	64.1	81.8	69.5	73.9	74.4	69.8	69.1	67.8	66.2	62.0	60.2	57.9	55.9	53.9	50.4	84.3
67	25-35	12/13/93	3-2	F	V	L	48	39.1	46.1	53.7	51.2	61.2	62.1	60.9	67.0	65.5	67.2	72.5	71.0	73.4	74.4	72.8	72.2	71.1	70.3	69.2	66.4	63.0	60.8	57.9	57.0	82.4
68	25-38	12/13/93	2-2	V	V		47	45.4	47.2	52.9	59.1	57.7	61.1	70.1	62.1	65.5	69.1	71.5	70.3	73.2	72.6	72.6	72.7	71.0	69.0	67.3	63.4	59.6	57.4	55.5	50.6	82.0
69	25-41	12/13/93	3	D	V		42	41.8	64.8	71.9	52.4	63.6	63.1	74.7	73.6	71.8	68.2	69.7	66.9	69.8	72.4	68.1	68.7	68.9	67.8	66.1	64.6	59.4	58.1	57.1	57.4	82.5
70	25-42	12/13/93	3-2	T	V		50	38.9	62.8	55.8	55.9	65.7	60.2	60.7	65.1	70.1	67.1	69.4	71.4	73.9	77.2	72.6	70.6	69.4	67.4	65.5	64.3	61.7	59.2	62.4	53.7	82.6
71	25-43	12/13/93	3-2	F	V	L	41	46.3	40.5	65.5	53.6	66.5	62.6	68.6	68.3	67.9	70.4	69.3	69.7	72.0	72.6	71.2	69.6	68.5	69.1	65.6	64.0	60.2	61.1	61.2	55.6	81.5
72	25-45	12/13/93	3-3	T	V		48	45.6	45.7	61.5	53.6	61.7	66.3	65.9	66.3	67.1	70.8	71.3	73.5	75.7	73.2	71.7	70.3	70.3	69.0	69.5	67.9	62.3	59.9	57.7	52.9	82.8
73	25-46	12/13/93	3-3	D	V		48	44.7	50.1	58.5	58.9	60.5	64.4	62.2	61.8	64.6	64.8	66.2	72.6	73.8	74.4	72.9	72.2	71.8	71.1	65.3	65.1	66.3	55.6	52.1	50.2	82.2

Figure C-12. Heavy Trucks - Downgrade, Non-Controlled Access Roadways

NUM	SUBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
1	26-2	12/20/93	3-2	V			57	45.1	48.4	48.8	52.9	54.3	54.9	56.3	57.0	57.9	58.5	61.4	69.2	74.2	72.2	71.2	71.0	70.0	66.6	62.6	59.2	56.5	56.2	49.6	45.0	80.0
2	26-5	12/20/93	3-2	V	V		60	40.8	46.8	49.4	59.4	58.1	58.6	60.6	58.2	60.3	62.7	71.2	71.8	71.2	73.3	72.9	71.0	69.1	67.4	65.3	64.1	61.2	59.6	54.6	50.8	81.0
3	26-6	12/20/93	3-2	F	V	L	59	37.1	46.4	43.7	50.3	53.9	56.4	58.5	59.0	60.0	72.4	66.9	68.5	72.7	72.5	73.5	71.1	68.8	65.1	64.3	60.6	57.4	54.1	50.1	45.8	80.8
4	26-7	12/20/93	3-2	F	V	U	45	36.5	54.3	43.9	50.8	59.9	54.2	59.0	56.2	54.6	62.6	64.3	64.8	69.1	71.4	69.5	67.7	68.0	64.0	62.2	58.4	55.9	50.8	46.7	43.7	77.7
5	26-9	12/20/93	3-2	V	V		54	39.6	46.1	54.4	50.1	55.7	59.8	57.5	58.6	62.5	61.2	67.4	68.5	70.5	72.2	69.8	69.8	69.6	68.2	65.9	63.6	60.1	59.6	56.7	52.1	79.5
6	26-10	12/20/93	3	D	V		56	46.4	51.2	51.1	63.5	57.8	56.5	66.5	60.5	66.1	66.5	65.6	70.0	73.7	73.4	72.7	72.0	70.4	69.9	67.5	64.0	60.1	57.6	53.5	49.5	81.5
7	26-11	12/20/93	3-2	T	V		55	39.5	43.9	49.9	51.9	53.3	60.2	60.5	55.7	60.8	58.1	73.4	72.1	75.1	74.3	72.8	70.5	68.4	66.0	64.1	60.7	57.2	54.8	50.6	47.1	81.7
8	26-14	12/20/93	3-2	V	V		53	46.4	50.1	51.7	52.8	53.2	56.6	58.4	57.6	60.9	63.7	63.5	69.3	75.6	73.0	70.6	69.2	67.8	66.6	65.3	59.1	56.1	53.1	47.8	44.3	80.3
9	26-16	12/20/93	2-1	V			68	48.0	45.8	53.4	57.4	58.4	57.2	55.9	59.8	61.2	60.6	71.6	68.7	72.7	73.2	72.2	71.7	69.2	69.3	69.6	68.8	62.5	60.7	58.7	50.5	81.3
10	26-23	12/20/93	2-2	V	V		61	42.0	48.0	49.7	50.6	52.8	55.5	60.9	67.2	58.5	58.5	66.7	69.5	73.0	72.2	71.1	69.9	67.5	67.0	67.2	64.6	59.7	57.0	52.7	49.0	80.1
11	26-28	12/20/93	2-2	V	V		58	40.4	48.6	56.3	54.3	52.8	56.9	58.7	58.3	62.1	67.7	66.9	68.6	71.7	74.7	71.6	70.6	70.2	69.2	69.3	66.5	66.0	66.6	63.9	53.1	81.3
12	26-29	12/20/93	3-3	F		L	85	42.1	55.2	54.0	69.4	67.8	69.9	72.6	75.8	78.9	85.0	83.8	82.8	81.1	84.5	81.0	81.5	77.1	76.5	73.9	74.8	73.1	71.5	65.3	60.0	92.5
13	26-31	12/20/93	3-2	V	V		52	43.7	51.2	54.3	56.2	49.7	54.5	56.4	59.8	59.5	61.8	66.7	67.1	72.6	76.6	75.6	72.3	69.0	66.9	62.7	59.6	55.9	54.1	49.6	44.9	81.7
14	26-34	12/20/93	3-2	V	V		64	39.1	49.3	57.4	52.0	56.6	62.2	61.5	59.9	64.1	65.2	68.8	71.7	72.6	76.3	72.7	71.3	69.6	67.9	66.8	63.0	61.1	64.1	53.0	48.4	81.8
15	26-35	12/20/93	3-3	F	V	L	49	53.7	53.1	44.3	63.1	57.9	67.4	58.2	67.5	74.4	73.7	74.0	73.8	72.2	71.5	73.7	72.4	69.9	66.5	64.9	63.1	60.0	56.7	54.2	48.8	83.2
16	26-37	12/20/93	3-2	V	V		57	43.7	48.4	51.5	49.9	53.7	54.0	59.6	59.1	56.5	60.8	66.8	67.6	70.4	74.1	73.0	71.8	70.7	67.2	66.5	63.2	61.4	63.4	53.9	49.7	80.6
17	28-6	12/06/93	3	D	V	U	47	51.6	51.3	63.1	58.7	69.6	81.6	73.8	75.1	73.9	79.3	76.8	76.4	74.5	74.0	73.5	70.9	68.0	66.0	63.6	62.7	60.9	59.2	58.2	54.7	87.1
18	28-9	12/06/93	3-1	V	V		44	38.7	39.9	46.3	55.5	57.5	59.7	66.2	60.8	74.1	71.1	71.3	71.1	74.6	76.3	77.0	72.7	71.5	70.0	68.2	65.4	63.0	60.4	57.4	53.1	84.0
19	28-11	12/06/93	3-2	V	V		46	49.5	47.9	45.7	55.7	52.5	56.5	60.4	60.1	64.4	67.2	66.8	69.0	70.5	70.2	69.4	68.1	68.5	68.3	64.2	61.6	55.9	54.7	50.2	45.9	79.0
20	28-13	12/06/93	3-2	V	V		58	45.4	55.8	56.7	51.1	58.9	57.1	62.3	64.9	65.8	68.0	71.8	74.3	77.8	75.6	71.4	70.7	71.5	74.3	71.7	73.4	69.1	64.0	60.3	54.0	84.3
21	28-16	12/06/93	3-2	V	V		52	38.6	44.3	44.9	51.9	49.7	56.6	59.0	60.7	63.5	67.4	72.8	69.0	70.0	75.1	72.9	69.1	67.7	65.2	62.1	58.9	57.6	55.0	53.8	47.3	80.8
22	28-21	12/06/93	3-2	V	H		54	44.6	45.2	49.0	53.5	55.1	56.1	59.1	63.8	65.0	70.2	72.0	70.4	70.9	73.4	71.3	68.4	66.7	65.5	63.8	61.4	58.2	56.5	51.5	44.4	80.5
23	28-22	12/06/93	3	T	V	L	61	47.1	49.7	50.4	53.3	57.6	56.2	59.9	59.8	65.3	70.2	73.6	76.2	74.1	71.0	70.6	69.0	79.0	71.5	64.0	62.3	60.3	55.9	52.5	47.9	83.8
24	28-28	12/06/93	3-2	V	V		47	49.4	45.3	58.7	54.3	56.9	57.1	59.7	59.1	59.6	69.7	69.9	71.0	70.5	70.9	69.6	67.4	67.4	62.8	58.8	56.5	52.9	51.1	48.3	44.9	79.2
25	28-30	12/06/93	3-2	V	V		47	47.0	52.8	62.0	55.2	62.6	60.6	60.8	66.4	68.3	70.0	73.8	73.0	74.6	73.9	72.6	76.6	74.5	81.8	78.9	82.8	79.4	76.3	74.5	70.1	89.1
26	28-36	12/06/93	3-2	V	V		59	38.7	58.1	48.1	51.3	54.8	54.9	61.1	63.3	63.5	70.3	79.8	77.6	75.6	75.2	69.5	68.2	68.0	71.2	71.7	69.6	62.7	62.9	65.3	57.5	84.9
27	28-38	12/06/93	3-2	V	V		52	45.6	41.4	49.7	50.7	52.9	55.7	57.2	61.0	63.5	70.9	71.7	73.7	73.6	71.6	70.4	69.5	66.1	64.7	61.0	58.7	55.6	51.8	48.8	45.6	80.9
28	28-39	12/06/93	2-2	V	V		50	42.0	39.0	47.8	53.2	55.9	55.7	59.8	59.8	62.1	69.6	73.6	76.8	73.7	73.6	69.3	66.8	65.6	64.5	61.9	59.9	55.4	51.7	48.1	44.9	81.9
29	28-40	12/06/93	2-2		V		44	43.5	47.0	48.6	53.6	49.5	54.1	57.5	61.6	63.5	70.0	74.6	71.7	72.2	73.3	68.5	67.3	66.7	64.9	64.2	60.9	59.4	59.2	52.2	48.1	80.9
30	28-42	12/06/93	3	T	V		52	38.2	40.0	45.6	55.3	70.3	61.3	60.3	65.9	67.5	73.4	74.1	75.2	74.5	73.7	70.7	73.8	71.4	70.6	72.0	69.7	67.7	66.1	68.4	59.7	84.1
31	28-43	12/06/93	3-2		V		46	40.2	44.4	53.8	48.4	48.6	60.0	59.9	59.3	62.8	69.1	68.0	72.5	74.1	73.0	70.2	69.4	65.9	64.0	60.9	58.5	57.8	54.2	52.5	47.2	80.5
32	28-46	12/06/93	2-2		H		52	48.2	42.4	50.9	56.0	54.0	58.2	62.3	59.7	63.0	65.1	66.5	73.9	73.5	72.6	68.5	68.0	65.6	62.9	60.7	56.3	54.1	50.7	47.1	44.6	80.0
33	28-47	12/06/93	2-2	V	V		47	48.9	42.6	50.9	53.7	56.8	56.7	60.3	64.7	64.3	65.8	70.4	71.4	72.8	73.4	69.3	68.2	66.8	64.5	63.1	64.7	63.1	59.5	53.5	48.2	80.4
34	28-48	12/06/93	2-2	V	V		58	46.3	41.9	49.2	51.5	54.8	56.1	61.9	62.8	64.6	65.5	72.2	72.2	73.5	74.0	74.0	70.6	67.9	65.5	63.4	59.3	56.1	56.1	49.1	46.0	81.5
35	29-4	11/30/93	3-2	V	V		42	45.3	43.7	53.1	57.7	64.9	67.1	62.0	68.0	67.1	71.3	68.5	65.4	69.3	66.6	65.8	65.8	64.5	62.2	60.3	58.4	57.0	56.2	52.7	49.2	78.7
36	29-10	11/30/93	3-2	D	V		41	44.3	42.9	52.4	54.4	56.0	54.8	60.8	59.0	61.0	67.2	66.1	67.6	68.1	65.4	65.6	67.8	64.9	61.9	59.5	56.2	51.7	48.8	44.6	41.8	76.6
37	29-11	11/30/93	3-2	V	V		32	44.7	48.1	64.8	50.6	53.3	61.5	62.5	61.5	71.9	60.6	64.5	68.8	64.8	67.7	71.4	66.0	65.4	62.8	60.0	62.0	59.8	59.3	55.5	55.1	78.6
38	29-13	11/30/93	3-2	V	V		35	43.8	40.3	56.5	48.7	53.5	66.0	54.7	57.0	58.0	60.8	64.0	65.1	64.5	62.8	65.5	65.0	64.2	65.2	63.3	60.7	57.5	57.0	53.3	59.9	75.6
39	29-15	11/30/93	3-2	V	V		35	40.4	44.1	56.9	55.0	58.3	58.4	56.1	56.6	63.3	76.3	66.4	64.5	70.5	69.4	70.4	71.7	69.3	65.7	63.7	64.1	58.7	54.7	51.5	48.1	80.8
40	29-16	11/30/93	3-2	F	V	U	38	39.2	42.5	48.4	51.2	56.0	52.5	56.1	55.9	60.8	65.8	68.0	64.8	66.0	63.4	64.0	64.5	63.8	58.8	57.8	57.1	50.5	48.3	44.5	42.7	75.0
41	29-19	11/30/93	3-2	V	V		40	37.9	42.2	43.2	49.0	54.5	58.9	63.8	59.7	78.5	80.8	57.4	60.7	64.1	64.0	61.9	64.1	61.9	58.3	55.8	51.8	50.7	47.1	44.4	42.9	83.2

Figure C-12. Heavy Trucks - Downgrade, Non-Controlled Access Roadways
(Continued)

NUM	SOBS	DATE	AXL	VT	XH	LC	SPD	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	LMAX
42	29-20	11/30/93	3	G	V		42	41.5	41.8	42.7	50.1	58.2	58.8	62.5	63.5	69.2	63.8	63.8	64.1	64.6	68.1	68.2	68.3	65.6	66.2	64.4	62.0	60.1	57.0	52.8	50.4	77.6
43	29-22	11/30/93	3-2	V			34	40.4	42.4	45.7	47.8	54.6	58.9	56.5	58.0	72.4	65.3	63.5	65.2	66.3	63.8	62.4	63.3	60.7	58.2	55.0	52.7	50.0	47.3	43.9	41.4	76.2
44	29-23	11/30/93	3-2	V	V		34	40.5	42.2	49.0	50.9	56.7	52.2	52.7	55.4	58.3	82.3	67.6	64.6	68.0	64.0	64.9	63.3	62.3	61.4	58.2	55.5	52.5	52.7	45.8	43.7	83.0
45	29-26	11/30/93	2-1	V	V		33	42.1	45.1	50.0	49.0	58.0	59.6	73.1	66.7	64.4	70.2	67.2	66.8	65.5	66.6	64.5	63.3	62.4	60.0	58.0	54.6	51.8	48.7	45.6	45.6	78.3
46	29-27	11/30/93	3-2	D	V		40	38.8	41.5	52.3	56.6	57.0	54.5	53.5	59.3	58.2	66.2	62.3	75.9	65.2	64.3	68.2	66.1	64.6	63.2	59.8	54.6	50.8	50.1	45.1	43.2	78.5
47	29-31	11/30/93	3-2	FS	V		42	44.5	45.5	48.5	57.7	59.1	60.1	66.4	65.2	67.2	67.0	69.9	73.8	72.3	69.5	76.6	73.4	71.9	68.8	69.5	62.7	60.7	56.0	49.6	45.9	82.6
48	29-33	11/30/93	3-2	V	V		44	43.4	44.6	64.9	48.4	57.1	59.8	59.6	57.7	64.6	64.9	70.8	75.5	69.8	69.3	66.7	65.7	63.9	60.9	59.6	57.5	54.5	52.0	55.2	45.8	79.7
49	29-37	11/30/93	3-2	V	V		38	40.5	48.1	51.6	52.5	54.3	55.1	58.6	59.2	61.0	59.4	72.3	64.0	63.9	67.5	64.7	63.6	63.3	59.9	57.8	52.5	49.5	46.7	43.2	41.6	76.2
50	29-42	11/30/93	3-2	V	V		39	38.1	45.6	49.0	53.6	55.4	51.9	61.1	60.7	61.9	69.5	68.5	62.7	63.5	62.0	61.3	62.6	60.8	61.1	58.6	55.8	61.6	50.3	45.3	44.6	75.5
51	29-45	11/30/93	3-2	T	V		47	38.9	41.0	54.1	49.4	54.7	56.6	57.4	58.9	66.6	67.4	81.9	76.5	66.7	71.7	68.9	65.6	64.4	63.2	63.0	61.5	57.4	62.5	48.9	46.1	84.0
52	29-48	11/30/93	3-2	T	V		36	43.6	44.5	52.1	53.5	57.2	60.7	57.8	59.9	58.2	62.5	64.7	63.1	66.6	63.4	63.0	64.1	63.1	57.2	56.3	53.8	50.9	49.3	44.4	42.0	74.1
53	29-50	11/30/93	3	G	V		32	41.9	39.7	67.3	44.6	54.4	72.7	56.4	57.4	62.8	73.1	65.1	64.3	66.8	64.0	65.3	64.9	66.1	67.6	62.9	61.8	61.3	60.9	57.8	54.4	79.2
54	29-51	11/30/93	3-2	F	V	U	36	39.7	53.3	51.8	56.7	55.2	59.3	60.1	61.2	63.9	69.1	63.7	69.7	69.2	67.0	66.7	67.4	68.6	68.8	67.0	66.5	63.2	59.6	59.5	56.7	79.0
55	30-1	12/02/93	3	G	V		47	49.4	47.1	49.2	54.7	53.8	53.7	64.3	59.3	59.1	65.0	62.6	68.9	72.8	70.6	70.2	68.9	67.8	64.6	62.9	61.9	58.8	57.9	59.9	53.4	79.1
56	30-2	12/02/93	2-2	V	V		43	47.2	46.1	59.5	49.4	51.4	58.3	63.9	72.7	63.7	68.6	65.8	68.1	68.7	71.6	71.1	70.8	68.3	65.1	62.7	60.0	58.3	54.9	51.7	48.5	80.2
57	30-3	12/02/93	4	D	V	L	40	44.0	44.8	49.1	56.1	62.4	59.8	63.6	60.6	68.4	66.2	64.1	70.2	68.4	71.2	70.1	69.8	67.7	64.6	61.4	59.6	56.7	54.0	51.0	46.5	79.2
58	30-4	12/02/93	4	D	V	L	43	45.4	51.8	77.0	60.9	65.0	70.4	63.8	65.0	66.2	69.7	64.7	66.1	68.9	70.7	71.0	70.6	70.7	68.6	67.8	65.2	62.3	60.6	57.8	58.3	82.3
59	30-6	12/02/93	4	D	V		49	49.5	48.7	60.7	55.1	56.1	58.5	67.9	67.4	66.8	77.6	65.5	67.1	70.5	70.2	70.2	69.7	66.8	64.4	62.3	59.2	56.9	56.1	54.2	55.2	81.4
60	30-9	12/02/93	3	D	V		39	45.5	49.2	71.8	54.2	52.7	64.4	55.8	67.4	71.9	64.9	70.9	64.6	68.2	69.9	69.8	66.0	64.4	64.1	61.5	59.9	57.5	54.8	55.1	52.8	79.9
61	30-12	12/02/93	3	D	V	L	38	42.6	41.7	49.6	50.0	54.0	57.1	58.6	63.2	70.9	66.3	63.9	65.1	68.4	69.6	68.9	69.4	67.2	64.6	64.6	60.9	58.1	59.8	53.0	49.1	78.6
62	30-17	12/02/93	4	D	V		44	47.1	55.6	55.7	57.4	62.9	59.0	65.1	64.8	67.7	75.7	69.6	66.6	72.6	71.4	69.9	71.6	68.2	67.1	65.8	61.0	59.5	55.9	54.8	51.5	81.5
63	30-20	12/02/93	3-2	T	V		37	48.8	45.0	51.6	57.2	59.5	60.1	63.7	62.3	70.0	61.6	66.4	67.8	69.6	70.5	69.7	70.3	70.0	66.3	63.5	62.3	59.9	60.8	56.4	49.6	79.5
64	30-23	12/02/93	3-2	D	V		52	44.3	50.8	50.8	60.8	60.7	63.5	70.1	69.6	69.6	72.3	69.9	71.1	71.3	74.5	72.3	71.7	69.1	66.1	64.0	60.9	58.0	59.1	52.7	47.3	82.2
65	30-24	12/02/93	4	D	H	L	40	43.2	50.6	65.2	67.9	61.3	68.6	66.8	71.8	75.0	74.8	84.0	84.2	86.6	90.2	87.5	82.9	84.1	82.7	88.5	84.0	84.7	83.0	78.7	72.0	96.9
66	30-26	12/02/93	3-2	T	V		37	46.5	60.1	48.7	53.6	61.8	60.1	64.9	66.2	75.5	62.3	62.3	66.4	67.8	68.7	66.6	67.6	66.3	69.7	67.4	68.9	62.1	62.7	59.5	52.9	80.4
67	30-27	12/02/93	3	D	V	L	43	40.5	49.3	51.8	58.7	57.7	60.8	62.1	65.3	65.1	75.2	64.3	65.1	69.8	69.9	73.2	73.0	67.9	68.9	68.6	63.8	60.0	64.1	54.4	50.0	81.4
68	30-29	12/02/93	3-2	D	V		41	41.9	43.7	51.3	55.6	56.0	56.0	54.9	57.6	63.7	60.5	66.0	68.0	68.8	71.4	71.2	69.5	67.8	66.1	63.1	60.5	56.5	54.4	50.8	45.6	78.7
69	30-32	12/02/93	3-2	T	V		54	42.8	45.2	51.6	57.8	56.0	59.3	65.0	63.8	64.9	61.8	64.7	77.7	69.8	71.6	70.6	70.6	68.6	65.9	63.3	60.7	59.5	59.0	56.3	54.7	81.4
70	30-35	12/02/93	3	D	V	L	44	41.5	43.7	68.0	56.9	58.9	71.7	60.4	67.3	69.0	62.6	66.2	68.3	70.4	72.5	70.1	67.6	66.3	65.2	64.1	60.8	59.5	58.3	55.3	53.2	80.3
71	30-37	12/02/93	3	D	V	L	50	50.6	48.4	64.5	59.2	76.3	65.2	67.4	63.5	66.3	63.9	62.8	66.2	68.3	74.4	75.0	68.8	66.9	65.8	65.3	62.1	58.6	57.2	53.9	55.0	82.0
72	30-38	12/02/93	3	G	V		54	45.7	46.7	51.3	54.5	57.8	55.5	57.7	63.4	64.7	71.0	69.8	69.4	73.4	72.9	71.5	77.5	71.3	69.8	67.7	63.6	59.9	56.2	52.8	50.2	82.6
73	30-44	12/02/93	4	T	V		42	45.1	42.7	55.5	54.1	60.5	66.7	63.3	68.8	66.5	65.6	69.2	67.8	67.9	68.8	69.6	68.5	68.2	64.8	63.6	64.1	67.0	61.7	59.0	52.1	79.6
74	30-49	12/02/93	3-2	V	V		42	49.9	51.2	56.6	53.5	54.7	58.2	61.6	57.7	67.9	64.7	60.8	63.4	66.8	70.0	69.6	68.0	67.2	65.1	63.2	60.6	57.2	52.2	48.0	43.5	77.7
75	30-53	12/02/93	3-2	V	V		46	46.7	49.4	61.1	54.0	56.1	60.6	66.2	66.6	63.6	70.7	68.2	70.2	70.0	73.0	71.8	71.5	69.4	67.0	66.3	62.2	60.7	58.6	55.3	51.2	80.9
76	30-54	12/02/93	3	D	V	L	39	48.2	49.5	63.2	63.5	63.3	66.6	60.9	64.7	65.1	64.9	69.3	68.2	68.2	70.5	67.9	68.4	70.6	70.6	71.4	71.6	66.8	64.3	59.1	52.6	81.1
77	30-56	12/02/93	3-2	D	V		40	42.2	46.3	48.9	58.6	55.2	60.0	58.8	61.3	62.6	59.6	65.9	71.4	71.1	71.0	72.5	70.6	69.6	66.8	64.6	61.5	58.6	55.6	52.2	46.2	80.0
78	30-58	12/02/93	3-2	T	V		46	43.6	42.0	50.6	52.1	55.9	59.7	65.7	62.3	62.2	62.5	68.3	66.8	70.4	73.6	71.3	71.0	69.2	67.2	63.3	60.2	57.4	59.0	51.0	46.0	80.0
79	30-59	12/02/93	3-2	V	V		42	44.2	43.8	49.8	49.5	55.4	57.0	59.4	60.7	58.6	66.2	61.6	64.8	68.9	70.0	69.6	66.5	65.4	64.8	66.1	63.6	58.9	55.6	50.1	46.2	77.6
80	30-60	12/02/93	3	D	V		47	44.3	45.6	52.2	74.4	59.3	61.8	76.1	72.3	69.3	75.7	70.7	70.1	70.9	72.0	72.6	72.4	70.2	69.0	69.1	68.1	66.9	67.3	64.7	62.4	84.3

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Technical Information Service
Springfield, VA 22161 (703) 487-4650